

P-661HNU-Fx

802.11n Wireless ADSL2+ 4-port Security Gateway

Support Notes

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FAQ

ZLD FAQ

1. What is ZLD?

ZLD is ZyXEL Linux Distribution. It is the Linux based platform absorbed free and open source software on our routers that delivers network services and applications. It is designed in a modular fashion so it is easy for developers to add new features.

2. What's Multilingual Embedded Web Configurator?

Multilingual Embedded Web Configurator means that it can display with 4 kinds of languages: English, Turkish, German and French. By factory default it displays with English, and you can change it in Web GUI.

3. How do I update the firmware and configuration file?

You can do this if you access the P-661HNU-Fx as Administrator. You can upload the firmware and configuration file to Prestige from Web Configurator, or using FTP or TFTP client software. You CAN NOT upload the firmware and configuration file via Telnet because the Telnet connection will be dropped during uploading the firmware. Please do not power off the router right after the FTP or TFTP uploading is finished, the router will upload the firmware to its flash at this moment.

Note: There may be firmware that could not be upgraded from Web Configurator. In this case, ZyXEL will prepare special Upload Software for you. Please read the firmware release note carefully when you want to upload a new fireware.

4. What should I do if I forget the system password?

In case you forget the system password, you can erase the current configuration and restore factory defaults this way:

Use the **RESET** button on the rear panel of P-661HNU-Fx to reset the router. After the router is reset, the LAN IP address will be reset to '**192.168.1.1**', the common user account will be reset to '**user/1234**', the Administrator account will be reset to '**admin/1234**'.

5. How to use the Reset button?

- a. Turn your P-661HNU-Fx on. Make sure the **POWER** led is on (not blinking)

- b. Press the **RESET** button for longer than one second and shorter than five seconds and release it.
- c. Press the **RESET** button for six seconds and then release it. If the **POWER** LED begins to blink, the default configuration has been restored and the P-661HNU-Fx restarts.

6. Is it possible to access a server running behind SUA from the outside Internet? How can I do it?

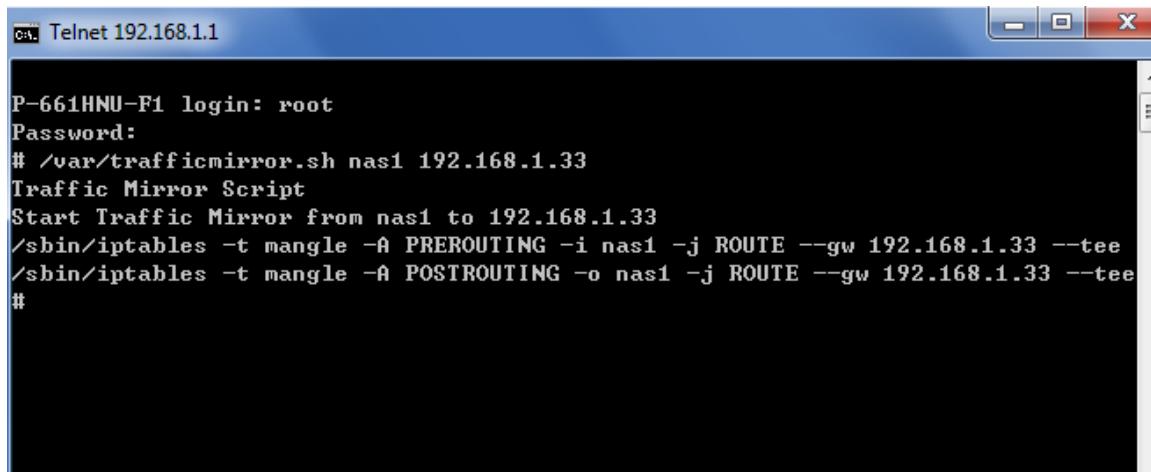
Yes, it is possible because P-661HNU-Fx delivers the packet to the local server by looking up to a SUA server table. Therefore, to make a local server accessible to the outside users, the port number and the inside IP address of the server must be configured. (You can configure it in Web Configurator, Advanced Setup, **Network Setting -> NAT -> Port Forwarding**).

7. Is there any troubleshooting method on ZLD platform?

You could mirror WAN packet to LAN host

Telnet into the device, trigger command '/var/trafficmirror.sh nas1 192.168.1.x'

Note: It is protected by super username & password, 'root/1234' by factory default.



```
P-661HNU-F1 login: root
Password:
# /var/trafficmirror.sh nas1 192.168.1.33
Traffic Mirror Script
Start Traffic Mirror from nas1 to 192.168.1.33
/sbin/iptables -t mangle -A PREROUTING -i nas1 -j ROUTE --gw 192.168.1.33 --tee
/sbin/iptables -t mangle -A POSTROUTING -o nas1 -j ROUTE --gw 192.168.1.33 --tee
#
```

Make sure your PC which is used to capture WAN packets has been set with a static ip 192.168.1.x in case the PC will be allocated another IP after DHCP lease time.

Product FAQ

1. How can I manage P-661HNU-Fx?

- Multilingual Embedded Web GUI for Local and Remote management
- Telnet support ('root/1234' Protected) for remote configuration change and status monitoring
- FTP sever, firmware upgrade and configuration backup and restore are supported('admin/1234' Protected)

2. What is the default password for Web Configurator?

There are two different accounts for P-661HNU-Fx Web Configurator:

Common User Account and **Administrator Account**.

By factory default the password for the two accounts are:

- Common User Account: **user/1234**
- Administrator Account: **admin/1234**.

You can change the password after you logging in the Web Configurator.

Please record your new password whenever you change it. The system will lock you out if you have forgotten your password.

3. What's the difference between 'Common User Account' and 'Administrator Account'?

For Common User Account, it can just change the password of common user but can't change the password of Administrator.

For Administrator Account, it can change both Administrator Account's password and Common User Account's password.

Moreover, to manage the P-661HNU-Fx via Telnet, you should use another account 'root/1234'.

4. Will the device work with my Internet connection?

P-661HNU-Fx is designed to be compatible with major ISPs utilize ADSL as a broadband service. P-661HNU-Fx offers Ethernet ports to connect to your computer so the device is placed in the line between the computer and your ISP. If your ISP supports PPPoE you can also use the device, because PPPoE is supported in the device.

5. How do I know the P-661HNU-Fx's WAN IP address assigned by the ISP?

You can view "- IP Address : x.x.x.x" shown in Web Configurator 'Connection Status -> System Info -> Device Information -> WAN 1 Information' to check this IP address.

6. What is the micro filter or splitter used for?

Generally, the voice band uses the lower frequency ranging from 0 to 4KHz, while ADSL data transmission uses the higher frequency. The micro filter acts as a low-pass filter for your telephone set to ensure that ADSL transmissions do not interfere with your voice transmissions. For the details about how to connect the micro filter please refer to the user's manual.

7. The P-661HNU-Fx supports Bridge and Router mode, what's the difference between them?

When the ISP limits some specific computers to access Internet, that means only the traffic to/from these computers will be forwarded and the other will be filtered. In this case, we use bridge mode which works as an ADSL modem to connect to the ISP. The ISP will generally give one Internet account and limit only one computer to access the Internet.

For most Internet users having multiple computers want to share an Internet account for Internet access, they have to add another Internet sharing device, like a router. In this case, we use the router mode which works as a general Router plus an ADSL Modem.

8. How do I know I am using PPPoE?

PPPoE requires a user account to login to the provider's server. If you need to configure a user name and password on your computer to connect to the ISP you are probably using PPPoE. If you are simply connected to the Internet when you turn on your computer, you probably are not. You can also check your ISP or the information sheet given by the ISP. Please choose PPPoE as the encapsulation type in the P-661HNU-Fx if the ISP uses PPPoE.

9. Why does my provider use PPPoE?

PPPoE emulates a familiar Dial-Up connection. It allows your ISP to provide services using their existing network configuration over the broadband connections. Besides, PPPoE supports a broad range of existing applications

and service including authentication, accounting, secure access and configuration management.

10. What is NAT?

The NAT (Network Address Translation-NAT RFC 1631) is the translation of an Internet Protocol address used within one network to a different IP address known within another network. One network is designated as the inside network and the other is the outside. Typically, one company maps its local inside network addresses to one or more global outside IP addresses and “unmaps” the global IP addresses on the incoming packets back into local IP addresses. The IP addresses for NAT can be either fixed or dynamically assigned by the ISP. In addition, you can designate servers, e.g., a Web server and a Telnet server, on your local network and make them accessible to the outside world. If you do not define any servers, the NAT offers the additional benefit of firewall protection. In such case, all incoming connections to your network will be filtered out by the CPE, thus preventing intruders from probing your network.

For more information on the IP address translation, please refer to RFC 1631, *The IP Network Address Translator (NAT)*.

11. How NAT works?

If we define the local IP addressed as the Internal Local Addresses (ILA) and the global IP addresses as the Inside Gloable Address (IGA), see the following figure. The term ‘inside’ refers to the set of networks that are subject to translation. The NAT operates by mapping the ILA to the IGA required for communication with hosts on other networks. It replaces the original IP source address (and TCP or UDP source port numbers) and then forwards each packet to the Internet ISP, thus making them appear as if they came from the NAT system itself (e.f., the PCE router). The CPE keeps track of the original addresses and port numbers, so the incoming reply packets can have their original values restored.

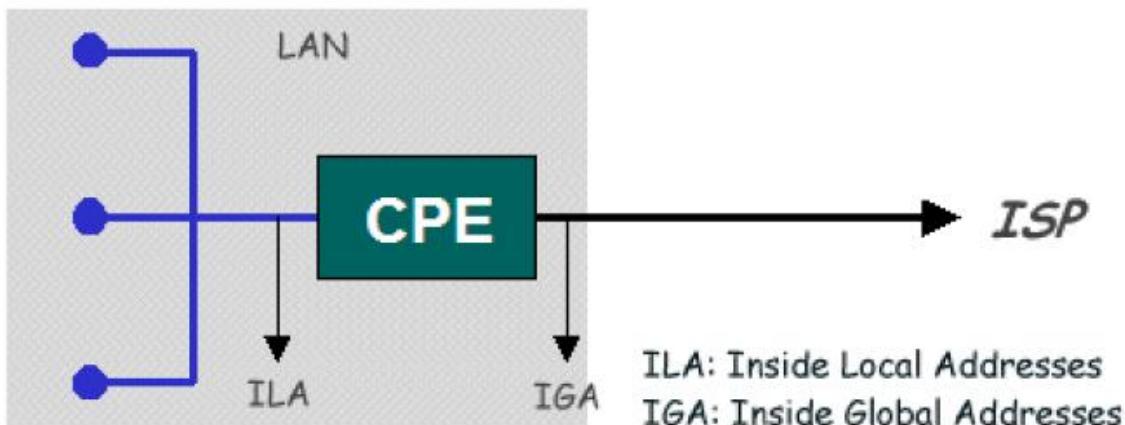


Figure1: Local/Global IP Addresses

12. What is DDNS?

The Dynamic DNS service allows you to alias a dynamic IP address to a static hostname, allowing your computer to be more easily accessed from various locations on the Internet. To use the service, you must first apply an account from several free Web servers such as <http://www.dyndns.org/>.

Without DDNS, we always tell the users to use the WAN IP of the P-661HNU-Fx to reach our internal server. It is inconvenient for the users if this IP is dynamic. With DDNS supported by the P-661HNU-Fx, you apply a DNS name (e.g., www.zyxel.com.tw) for your server (e.g., Web server) from a DDNS server. The outside users can always access the web server using the www.zyxel.com.tw regardless of the WAN IP of the P-661HNU-Fx.

When the ISP assigns the P-661HNU-Fx a new IP, the P-661HNU-Fx updates this IP to DDNS server so that the server can update its IP-to-DNS entry. Once the IP-to-DNS table in the DDNS server is updated, the DNS name for your web server (i.e., www.zyxel.com.tw) is still usable.

13. When do I need DDNS service?

When you want your internal server to be accessed by using DNS name rather than using the dynamic IP address we can use the DDNS service. The DDNS server allows to alias a dynamic IP address to a static hostname. Whenever the ISP assigns you a new IP, the P-661HNU-Fx sends this IP to the DDNS server for its updates.

14. What is DDNS wildcard? Does the P-661HNU-Fx support DDNS wildcard?

Some DDNS servers support the wildcard feature which allows the hostname, *.yourhost.dyndns.org, to be aliased to the same IP address as yourhost.dyndns.org. This feature is useful when there are multiple servers inside and you want users to be able to use things such as www.yourhost.dyndns.org and still reach your hostname.

Yes, the P-661HNU-Fx supports DDNS wildcard that http://www.dyndns.org/ supports. When using wildcard, you simply enter your host.dyndns.org in the Host field in 'Network Setting -> Dynamic DNS' to configure Dynamic DNS.

15. What is Traffic Shaping?

Traffic Shaping allocates the bandwidth to WAN dynamically and aims at boosting the efficiency of the bandwidth. If there are several VCs in the P-661HNU-Fx but only one VC activated at one time, the P-661HNU-Fx allocates all the Bandwidth to the VC and the VC gets full bandwidth. If another VCs are activated later, the bandwidth is yield to other VCs afterward.

16. Why do we perform traffic shaping in the P-661HNU-Fx?

The P-661HNU-Fx must manage traffic fairly and provide bandwidth allocation for different sorts of applications, such as voice, video, and data. All applications have their own natural bit rate. Large data transactions have a fluctuating natural bit rate. The P-661HNU-Fx is able to support variable traffic among different virtual connections. Certain traffic may be discarded if the virtual connection experiences congestion. Traffic shaping defines a set of actions taken by the P-661HNU-Fx to avoid congestion; traffic shaping takes measures to adapt to unpredictable fluctuations in traffic flows and other problems among virtual connections.

17. What do the parameters (PCR, SCR, MBS) mean?

Peak Cell Rate(PCR): The maximum bandwidth allocated to this connection. The VC connection throughput is limited by PCR.

Sustainable Cell Rate(SCR): The least guaranteed bandwidth of a VC. When there are multi-VCs on the same line, the VC throughput is guaranteed by SCR.

Maximum Burst Size(MBS): The amount of cells transmitted through this VC at the Peak Cell Rate before yielding to other VCs. Total bandwidth of the line is dedicated to single VC if there is only one VC on the line. However, as the other VC asking the bandwidth, the MBS defines the maximum number of cells transmitted via this VC with Peak Cell rate before yielding to other VCs.

The P-661HNU-Fx holds the parameters for shaping the traffic among its virtual channels. If you do not need traffic shaping, please set SCR = 0, MBS = 0 and PCR as the maximum value according to the line rate (for example, 2.3 Mbps line rate will result PCR as 5424 cell/sec.)

18. What do the ATM QoS Types (CBR, UBR, VBR-nRT, VBR-RT) mean?

Constant bit rate(CBR): An ATM bandwidth-allocation service that requires the user to determine a fixed bandwidth requirement at the time the connection is set up so that the data can be sent in a steady stream. CBR service is often used when transmitting fixed-rate uncompressed video.

Unspecified bit rate(UBR): An ATM bandwidth-allocation service that does not guarantee any throughput levels and uses only available bandwidth. UBR is often used when transmitting data that can tolerate delays, such as e-mail.

Variable bit rate(VBR): An ATM bandwidth-allocation service that allows users to specify a throughput capacity (i.e., a peak rate) and a sustained rate but data is not sent evenly. You can select VBR for bursty traffic and bandwidth sharing with other applications. It contains two subclasses:

Variable bit rate nonreal time (VBR-nRT):

Variable bit rate real time (VBR-RT):

ADSL FAQ

1. How does ADSL compare to Cable modems?

ADSL provides a dedicated service over a single telephone line; cable modems offer a dedicated service over a shared media. While cable modems have greater downstream bandwidth capabilities (up to 24 Mbps), that bandwidth is shared among all users on a line, and will therefore vary, perhaps dramatically, as more users in a neighborhood get online at the same time. Cable modem upstream traffic will in many cases be slower than ADSL, either because the particular cable modem is inherently slower, or because of rate reductions caused by contention for upstream bandwidth slots. The big difference between ADSL and cable modems, however, is the number of lines available to each. There are no more than 12 million homes passed today that can support two-way cable modem transmissions, and while the figure also grows steadily, it will not catch up with telephone lines for many years. Additionally, many of the older cable networks are not capable of offering a return channel; consequently, such networks will need significant upgrading before they can offer high bandwidth services.

2. What is the expected throughput?

In our test, we can get about 1.6Mbps data rate on 15Kft using the 26AWG loop. The shorter the loop, the better the throughput is.

3. What is the microfilter used for?

Generally, the voice band uses the lower frequency ranging from 0 to 4KHz, while ADSL data transmission uses the higher frequency. The micro filter acts as a low-pass filter for your telephone set to ensure that ADSL transmissions do not interfere with your voice transmissions. For the details about how to connect the micro filter please refer to the user's manual.

4. How do I know the ADSL line is up?

You can see the DSL LED Green on the P-661HNU-Fx's front panel is on when the ADSL physical layer is up.

5. How does the P-661HNU-Fx work on a noisy ADSL?

Depending on the line quality, the P-661HNU-Fx uses "Fall Back" and "Fall Forward" to automatically adjust the date rate.

6. Does the VC-based multiplexing perform better than the LLC-based multiplexing?

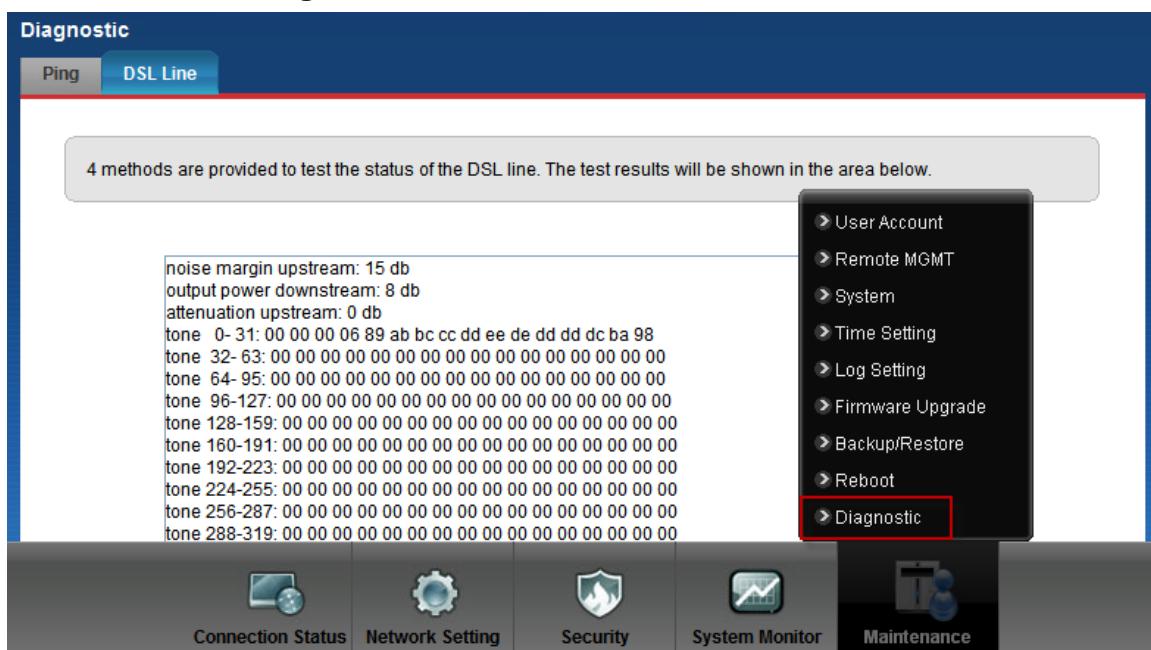
Though the LLC-based multiplexing can carry multiple protocols over a single VC, it requires extra header information to identify the protocol being carried on the virtual circuit (VC). The VC-based multiplexing needs a separate VC for carrying each protocol but it does not need the extra headers. Therefore, the VC-based multiplexing is more efficient.

7. How do I know the details of my ADSL line statistics?

- You can use the following CI commands to check the ADSL line statistics.

```
CI> dsl_cpe_pipe.sh g997lsg 0 1 (upstream)  
CI> dsl_cpe_pipe.sh g997lsg 1 1 (downstream)
```

- You can also do it in Web Configurator, Advanced Setup, Maintenance -> Diagnostic -> DSL Line -> DSL Line Status:



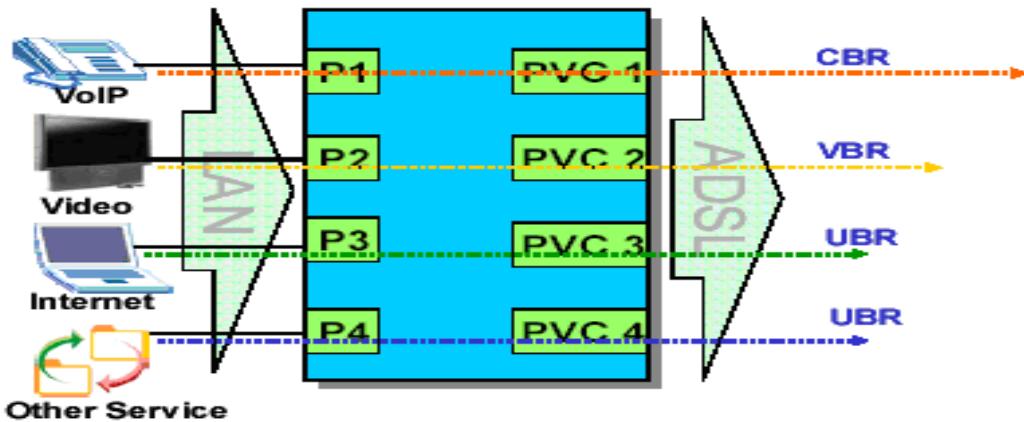
8. What are the signaling pins of the ADSL connector?

The signaling pins on the P-661HNU-Fx's ADSL connector are pin 3 and pin 4. The middle two pins for a RJ11 cable.

9. What is triple play?

More and more Telco/ISPs are providing three kinds of services (VoIP, Video and Internet) over one existing ADSL connection.

- The different services (such as video, VoIP and Internet access) require different Quality of Service.
- The high priority is Voice (VoIP) data.
- The Medium priority is Video (IPTV) data.
- The low priority is internet access such as ftp etc ...



Triple Play is a port-based policy to forward packets from different LAN port to different PVCs, thus you can configure each PVC separately to assign different QoS to different application.

Firewall FAQ

General

1. What is a network firewall?

A firewall is a system or group of systems that enforces an access-control policy between two networks. It may also be defined as a mechanism used to protect a trusted network from an untrusted network. The firewall can be thought of two mechanisms: One to block the traffic, and the other to permit traffic.

2. What makes P-661HNU-Fx secure?

The P-661HNU-Fx is pre-configured to automatically detect and thwart Denial of Service (DoS) attacks such as Ping of Death, SYN Flood, LAND attack, IP Spoofing, etc. It also uses stateful packet inspection to determine if an inbound connection is allowed through the firewall to the private LAN. The P-661HNU-Fx supports Network Address Translation (NAT), which translates the private local addresses to one or multiple public addresses. This adds a level of security since the clients on the private LAN are invisible to the Internet.

3. What are the basic types of firewalls?

Conceptually, there are three types of firewalls:

1. Packet Filtering Firewall
2. Application-level Firewall
3. Stateful Inspection Firewall

Packet Filtering Firewalls generally make their decisions based on the header information in individual packets. These headers information include the source, destination addresses and ports of the packets.

Application-level Firewalls generally are hosts running proxy servers, which permit no traffic directly between networks, and which perform logging and auditing of traffic passing through them. A proxy server is an application gateway or circuit-level gateway that runs on top of general operating system such as UNIX or Windows NT. It hides valuable data by requiring users to communicate with secure systems by mean of a proxy. A key drawback of this device is performance.

Stateful Inspection Firewalls restrict access by screening data packets against defined access rules. They make access control decisions based on IP address and protocol. They also 'inspect' the session data to assure the integrity of the connection and to adapt to dynamic protocols. The flexible nature of Stateful Inspection firewalls generally provides the best speed and transparency, however, they may lack the granular application level access control or caching that some proxies support.

4. What kind of firewall is the P-661HNU-Fx?

1. The P-661HNU-Fx's firewall inspects packets contents and IP headers. It is applicable to all protocols, that understands data in the packet is intended for other layers, from network layer up to the application layer.
2. The P-661HNU-Fx's firewall performs stateful inspection. It takes into account the state of connections it handles so that, for example, a legitimate incoming packet can be matched with the outbound request for that packet and allowed in. Conversely, an incoming packet masquerading as a response to a nonexistent outbound request can be blocked.
3. The P-661HNU-Fx's firewall uses session filtering, i.e., smart rules, that enhance the filtering process and control the network session rather than control individual packets in a session.
4. The P-661HNU-Fx's firewall is fast. It uses a hashing function to search the matched session cache instead of going through every individual rule for a packet.

5. Why do you need a firewall when your router has NAT built-in?

With the spectacular growth of the Internet and online access, companies that do business on the Internet face greater security threats. Although NAT restrict access to particular computers and networks, however, for the other companies this security may be insufficient, but firewall can maintain session state. Thus, for greater security, a firewall is considered.

6. What is Denials of Service (DoS) attack?

Denial of Service (DoS) attacks are aimed at devices and networks with a connection to the Internet. Their goal is not to steal information, but to disable a device or network so users no longer have access to network resources.

There are four types of DoS attacks:

1. Those that exploits bugs in a TCP/IP implementation such as Ping of Death and Teardrop.

2. Those that exploits weaknesses in the TCP/IP specification such as SYN Flood and LAND Attacks.
3. Brute-force attacks that flood a network with useless data such as Smurf attack.
4. IP Spoofing

7. What is Ping of Death attack?

Ping of Death uses a 'PING' utility to create an IP packet that exceeds the maximum 65535 bytes of data allowed by the IP specification. The oversize packet is then sent to an unsuspecting system. Systems may crash, hang, or reboot.

8. What is Teardrop attack?

Teardrop attack exploits weakness in the reassemble of the IP packet fragments. As data is transmitted through a network, IP packets are often broken up into smaller chunks. Each fragment looks like the original packet except that it contains an offset field. The Teardrop program creates a series of IP fragments with overlapping offset fields. When these fragments are reassembled at the destination, some systems will crash, hang, or reboot.

9. What is SYN Flood attack?

SYN attack floods a targeted system with a series of SYN packets. Each packet causes the targeted system to issue a SYN-ACK response. While the targeted system waits for the ACK that follows the SYN-ACK, it queues up all outstanding SYN-ACK responses on what is known as a backlog queue. SYN-ACKs are moved off the queue only when an ACK comes back or when an internal timer (which is set a relatively long intervals) terminates the TCP three-way handshake. Once the queue is full, the system will ignore all incoming SYN requests, making the system unavailable for legitimate users.

10. What is LAND attack?

In a LAN attack, hackers flood SYN packets to the network with a spoofed source IP address of the targeted system. This makes it appear as if the host computer sent the packets to itself, making the system unavailable while the target system tries to respond to itself.

11 What is Brute-force attack?

A Brute-force attack, such as 'Smurf' attack, targets a feature in the IP specification known as directed or subnet broadcasting, to quickly flood the target network with useless data. A Smurf hacker flood a destination IP

address of each packet is the broadcast address of the network, the router will broadcast the ICMP echo request packet to all hosts on the network. If there are numerous hosts, this will create a large amount of ICMP echo request packet, the resulting ICMP traffic will not only clog up the 'intermediary' network, but will also congest the network of the spoofed source IP address, known as the 'victim' network. This flood of broadcast traffic consumes all available bandwidth, making communications impossible.

12. What is IP Spoofing attack?

Many DoS attacks also use IP Spoofing as part of their attack. IP Spoofing may be used to break into systems, to hide the hacker's identity, or to magnify the effect of the DoS attack. IP Spoofing is a technique used to gain unauthorized access to computers by tricking a router or firewall into thinking that the communications are coming from within the trusted network. To engage in IP Spoofing, a hacker must modify the packet headers so that it appears that the packets originate from a trusted host and should be allowed through the router or firewall.

13. What are the default firewall rules in P-661HNU-Fx?

If you enable firewall, that means the firewall will block any unauthorized accesses to your network.

If you want to stop certain Internet services, you can enable LAN to WAN Services Blocking and add common services which are pre-configured to Blocked Services.

Configuration

1. How do I configure the firewall?

You can use the Web Configurator to configure the firewall for P-661HNU-Fx. By factory default, if you connect your PC to the LAN Interface of P-661HNU-Fx, you can access Web Configurator via 'http://192.168.1.1'.

2. How do I prevent others from configuring my firewall?

There are several ways to protect others from touching the settings of your firewall.

1. Change the default Administrator password and Common User password since it is required when setting up the firewall.

2. Enable MAC Filter, and add the MAC addresses of the LAN clients in your home or office to 'MAC Address Filter' table if you wish to allow only them to access your network. Then others can't configure your device any more.

MAC Filter

Enable MAC Filter and add the MAC addresses of the LAN clients in your home or office to the following table if you wish to allow only them to access your network. Sometimes, MAC Filter is considered a method to increase the security of your network.

MAC Address Filter : Enable Disable

Set	Allow	MAC Address
1	<input type="checkbox"/>	
2	<input type="checkbox"/>	
3	<input type="checkbox"/>	
4	<input type="checkbox"/>	
5	<input type="checkbox"/>	
6	<input type="checkbox"/>	

Connection Status Network Setting **Security** System Monitor Maintenance

3. Why can't I configure my P-661HNU-Fx using Web Configurator/Telnet over WAN?

There are two possible reasons that WWW/Telnet from WAN is blocked.

(1) You have disabled WWW/Telnet service in Web Configurator, Advanced setup, **Maintenance -> Remote MGMT**:

Remote MGMT

Remote MGMT enables various approaches to access this device remotely from a WAN and/or LAN connection.

Remote Management

Services	LAN/WLAN	WAN	Port
HTTPS	<input checked="" type="checkbox"/> Enable	<input type="checkbox"/> Enable	443
HTTP	<input checked="" type="checkbox"/> Enable	<input checked="" type="checkbox"/> Enable	80
TELNET	<input checked="" type="checkbox"/> Enable	<input checked="" type="checkbox"/> Enable	23
FTP	<input checked="" type="checkbox"/> Enable	<input type="checkbox"/> Enable	21
SSH/SCP/SFTP	<input checked="" type="checkbox"/> Enable	<input type="checkbox"/> Enable	22
ICMP	<input checked="" type="checkbox"/> Enable	<input type="checkbox"/> Enable	N/A
TR-064	<input checked="" type="checkbox"/> Enable	N/A	18888

Connection Status **Network Setting** **Security** **System Monitor** **Maintenance**

(2)A MAC filter set but your host is not in the MAC address list, **Security -> MAC Filter**

MAC Filter

Enable MAC Filter and add the MAC addresses of the LAN clients in your home or office to the following table if you wish to allow only them to access your network. Sometimes, MAC Filter is considered a method to increase the security of your network.

MAC Address Filter: Enable Disable

Set	Allow	MAC Address
1	<input type="checkbox"/>	
2	<input type="checkbox"/>	
3	<input type="checkbox"/>	
4	<input type="checkbox"/>	
5	<input type="checkbox"/>	
6	<input type="checkbox"/>	

Connection Status **Network Setting** **Security** **System Monitor** **Maintenance**

4. Why can't I upload the firmware and configuration file using FTP over WAN?

- (1) You have disabled FTP service in Web Configurator, Advanced setup, **Maintenance -> Remote MGMT**.
- (2)A MAC filter set but your host is not in the MAC address list, **Security -> MAC Filter**

Wireless FAQ

General FAQ

1. What is a Wireless LAN?

Wireless LANs provide all the functionality of wired LANs, without the need for physical connections (wires). Data is modulated onto a radio frequency carrier and transmitted through the ether. Typical bit-rates are 11Mbps and 54Mbps, although in practice data throughput is half of this. Wireless LANs can be formed simply by equipping PC's with wireless NICs. If connectivity to a wired LAN is required an Access Point (AP) is used as a bridging device. AP's are typically located close to the centre of the wireless client population.

2. What are the advantages of Wireless LAN?

Mobility: Wireless LAN systems can provide LAN users with access to real-time information anywhere in their organization. This mobility supports productivity and service opportunities not possible with wired networks.

Installation Speed and Simplicity: Installing a wireless LAN system can be fast and easy and can eliminate the need to pull cable through walls and ceilings.

Installation Flexibility: Wireless technology allows the network to go where wire cannot go.

Reduced Cost-of-Ownership: While the initial investment required for wireless LAN hardware can be higher than the cost of wired LAN hardware, overall installation expenses and life-cycle costs can be significantly lower. Long-term cost benefits are greatest in dynamic environments requiring frequent moves and changes.

Scalability: Wireless LAN systems can be configured in a variety of topologies to meet the needs of specific applications and installations. Configurations are easily changed and range from peer-to-peer networks suitable for a small number of users to full infrastructure networks of thousands of users that enable roaming over a broad area.

3. What is the disadvantage of Wireless LAN?

The speed of Wireless LAN is still relatively slower than wired LAN. The setup cost of Wireless LAN is relative high because the equipment cost including access point and PCMCIA Wireless LAN card is higher than hubs and CAT 5 cables.

4. Where can you find 802.11 wireless networks?

Airports, hotels, and even coffee shops like Starbucks are deploying 802.11 networks, so people can wirelessly surf the Internet with their laptops.

5. What is an Access Point?

The AP (access point also known as a base station) is the wireless server that with an antenna and a wired Ethernet connection that broadcasts information using radio signals. AP typically acts as a bridge for the clients. It can pass information to wireless LAN cards that have been installed in computers or laptops allowing those computers to connect to the campus network and the Internet without wires.

6. Is it possible to use wireless products from a variety of vendors?

Yes. As long as the products comply to the same IEEE 802.11 standard. The Wi-Fi logo is used to define 802.11b compatible products. Wi-Fi5 is a compatibility standard for 802.11a products running in the 5GHz band.

7. What is Wi-Fi?

The Wi-Fi logo signifies that a product is interoperable with wireless networking equipment from other vendors. A Wi-Fi logo product has been tested and certified by the Wireless Ethernet Compatibility Alliance (WECA). The Socket Wireless LAN Card is Wi-Fi certified, and that means that it will work (interoperate) with any brand of Access Point that is also Wi-Fi certified.

8. What types of devices use the 2.4GHz Band?

Various spread spectrum radio communication applications use the 2.4 GHz band. This includes WLAN systems (not necessarily of the type IEEE

802.11b), cordless phones, wireless medical telemetry equipment and Bluetooth™ short-range wireless applications, which include connecting printers to computers and connecting modems or hands-free kits to mobile phones.

9. Does the 802.11 interfere with Bluetooth device?

Any time devices are operated in the same frequency band, there is the potential for interference.

Both the 802.11b/g and Bluetooth devices occupy the same 2.4-to-2.483-GHz unlicensed frequency range—the same band. But a Bluetooth device would not interfere with other 802.11 devices much more than another 802.11 device would interfere. While more collisions are possible with the introduction of a Bluetooth device, they are also possible with the introduction of another 802.11 device, or a new 2.4 GHz cordless phone for that matter. But, Bluetooth devices are usually low-power, so the effects that a Bluetooth device may have on an 802.11 network, if any, aren't far-reaching.

10. Can radio signals pass through wall?

Transmitting through a wall is possible depending upon the material used in its construction. In general, metals and substances with a high water content do not allow radio waves to pass through. Metals reflect radio waves and concrete attenuates radio waves. The amount of attenuation suffered in passing through concrete will be a function of its thickness and amount of metal re-enforcement used.

11. What are potential factors that may causes interference among WLAN products?

Factors of interference:

- (1) Obstacles: walls, ceilings, furniture... etc.
- (2) Building Materials: metal door, aluminum studs.
- (3) Electrical devices: microwaves, monitors, electric motors.

Solution:

- (1) Minimizing the number of walls and ceilings
- (2) Antenna is positioned for best reception
- (3) Keep WLAN products away from electrical devices, eg: microwaves, monitors, electric motors, ..., etc.
- (4) Add additional APs if necessary.

12. What's the difference between a WLAN and a WWAN?

WLANs are generally privately owned, wireless systems that are deployed in a corporation, warehouse, hospital, or educational campus setting. Data rates are high and there are no per-packet charges for data transmission.

WWANs are generally publicly shared data networks designed to provide coverage in metropolitan areas and along traffic corridors. WWANs are owned by a service provider or carrier. Data rates are low and charges are based on usage. Specialized applications are characteristically designed around short, burst messaging.

13. Can I manually swap the wireless module without damage any hardware?

Yes, it will not harm the hardware, but the module will not be detected and work after inserting to the slot. You need to reboot the router to initialize the module.

14. What wireless security mode does P-661HNU-Fx support?

The wireless security modes supported on P-661HNU-Fx are: Static WEP, WPA-PSK, WPA, WPA2-PSK, and WPAPSKMixed.

15. What Wireless standard does P-661HNU-Fx support?

It supports IEEE 802.11b/g/n standard.

16. Does P-661HNU-Fx support MAC filtering?

Yes, it supports up to 32 MAC Address filtering.

17. Does P-661HNU-Fx support auto rate adaption?

Yes, it means that the AP on P-661HNU-Fx will automatically decelerate when devices move beyond the optimal range, or other interference is present. If the device moves back within the range of a higher-speed transmission, the connection will automatically speed up again. Rate shifting is a physical-layer mechanism transparent to the user and the upper layers of the protocol stack.

Advanced FAQ

1. What is Ad Hoc mode?

A wireless network consists of a number of stations without using an access point or any connection to a wired network.

2. What is Infrastructure mode?

Infrastructure mode implies connectivity to a wired communications infrastructure. If such connectivity is required the Access Points must be used to connect to the wired LAN backbone. Wireless clients have their configurations set for "infrastructure mode" in order to utilise access points relaying.

3. How many Access Points are required in a given area?

This depends on the surrounding terrain, the diameter of the client population, and the number of clients. If an area is large with dispersed pockets of populations then extension points can be used for extend coverage.

4. What is Direct-Sequence Spread Spectrum Technology – (DSSS)?

DSSS spreads its signal continuously over a wide frequency band. DSSS maps the information bearing bit-pattern at the sending station into a higher data rate bit sequence using a "chipping" code. The chipping code (also known as processing gain) introduces redundancy which allows data recovery if certain bit errors occur during transmission. The FCC rules the minimum processing gain should be 10, typical systems use processing gains of 20. IEEE 802.11b specifies the use of DSSS.

5. What is Frequency-hopping Spread Spectrum Technology – (FHSS)?

FHSS uses a narrowband carrier which hops through a predefined sequence of several frequencies at a specific rate. This avoids problems with fixed channel narrowband noise and simple jamming. Both transmitter and receiver must have their hopping sequences synchronized to create the effect of a single "logical channel". To an unsynchronised receiver an FHSS transmission appears to be short-duration impulse noise. 802.11 may use FHSS or DSSS.

6. Do I need the same kind of antenna on both sides of a link?

No. Provided the antenna is optimally designed for 2.4GHz or 5GHz operation. WLAN NICs often include an internal antenna which may provide sufficient reception.

7. Why the 2.4 GHZ Frequency range?

This frequency range has been set aside by the FCC, and is generally labeled the ISM band. A few years ago Apple and several other large corporations requested that the FCC allow the development of wireless networks within this frequency range. What we have today is a protocol and system that allows for unlicensed use of radios within a prescribed power level. The ISM band is populated by Industrial, Scientific and Medical devices that are all low power devices, but can interfere with each other.

8. What is Server Set ID (SSID)?

SSID is a configurable identification that allows clients to communicate to the appropriate base station. With proper configuration, only clients that are configured with the same SSID can communicate with base stations having the same SSID. SSID from a security point of view acts as a simple single shared password between base stations and clients.

9. What is an ESSID?

ESSID stands for Extended Service Set Identifier and identifies the wireless LAN. The ESSID of the mobile device must match the ESSID of the AP to communicate with the AP. The ESSID is a 32-character maximum string and is case-sensitive.

Security FAQ**1. How do I secure the data across the P-661HNU-Fx Access Point's radio link?**

To secure the data across the P-661HNU-Fx Access Point's radio link, we could select any one of the security mode: **Static 64/128 bit WEP, WPA-PSK, WPA, WPA2-PSK, WPA2.**

2. What is WEP?

Wired Equivalent Privacy. WEP is a security mechanism defined within the 802.11 standard and designed to make the security of the wireless medium

equal to that of a cable (wire). WEP data encryption was designed to prevent access to the network by "intruders" and to prevent the capture of wireless LAN traffic through eavesdropping. WEP allows the administrator to define a set of respective "Keys" for each wireless network user based on a "Key String" passed through the WEP encryption algorithm. Access is denied by anyone who does not have an assigned key. Note, WEP has shown to have fundamental flaws in its key generation processing.

3. What is WPA-PSK?

WPA-PSK (Wi-Fi Protected Access Pre-Shared Key) can be used if user do not have a Radius server but still want to benefit from it. Because WPA-PSK only requires a single password to be entered on wireless AP/gateway and wireless client. As long as the passwords match, a client will be granted access to the WLAN.

4. What is the difference between 40-bit and 64-bit WEP?

40 bit WEP and 64 bit WEP are the same encryption level and can interoperate. The lower level of WEP encryption uses a 40 bit (10 Hex character) as "secret key" (set by user), and a 24 bit "Initialization Vector" (not under user control) (40+24=64). Some vendors refer to this level of WEP as 40 bit, others as 64 bit.

5. What is a WEP key?

A WEP key is a user defined string of characters used to encrypt and decrypt data.

6. Will 128-bit WEP communicate with 64-bit WEP?

No. 128-bit WEP will not communicate with 64-bit WEP. Although 128 bit WEP also uses a 24 bit Initialization Vector, but it uses a 104 bit as secret key. Users need to use the same encryption level in order to make a connection.

7. Can the SSID be encrypted?

No, WEP only encrypts the data packets not the 802.11n management packets. The SSID is in the beacon and probe management messages and SSID goes over the air in clear text. This makes obtaining the SSID easy by sniffing 802.11n wireless traffic.

8. By turning off the broadcast of SSID, can someone still sniff the SSID?

Many APs by default have broadcasting the SSID turned on. Sniffers typically will find the SSID in the broadcast beacon packets. Turning off the broadcast of SSID in the beacon message (a common practice) does not prevent getting the SSID; since the SSID is sent in the clear in the probe message when a client associates to an AP, a sniffer just has to wait for a valid user to associate to the network to see the SSID.

9. What are Insertion Attacks?

The insertion attacks are based on placing unauthorized devices on the wireless network without going through a security process and review.

10. What is Wireless Sniffer?

An attacker can sniff and capture legitimate traffic. Many of the sniffer tools for Ethernet are based on capturing the first part of the connection session, where the data would typically include the username and password. An intruder can masquerade as that user by using this captured information. An intruder who monitors the wireless network can apply this same attack principle on the wireless.

Application Notes

General Application Notes

1. Internet Access Using P-661HNU-Fx under Bridge mode

- Setup your workstation
- Setup your P-661HNU-Fx under bridge mode

If the ISP limits some specific computers to access Internet, that means only the traffic to/from these computers will be forwarded and the other will be filtered. In this case, we use P-661HNU-Fx which works as an ADSL bridge modem to connect to the ISP. The ISP will generally give one Internet account and limit only one computer to access the Internet.

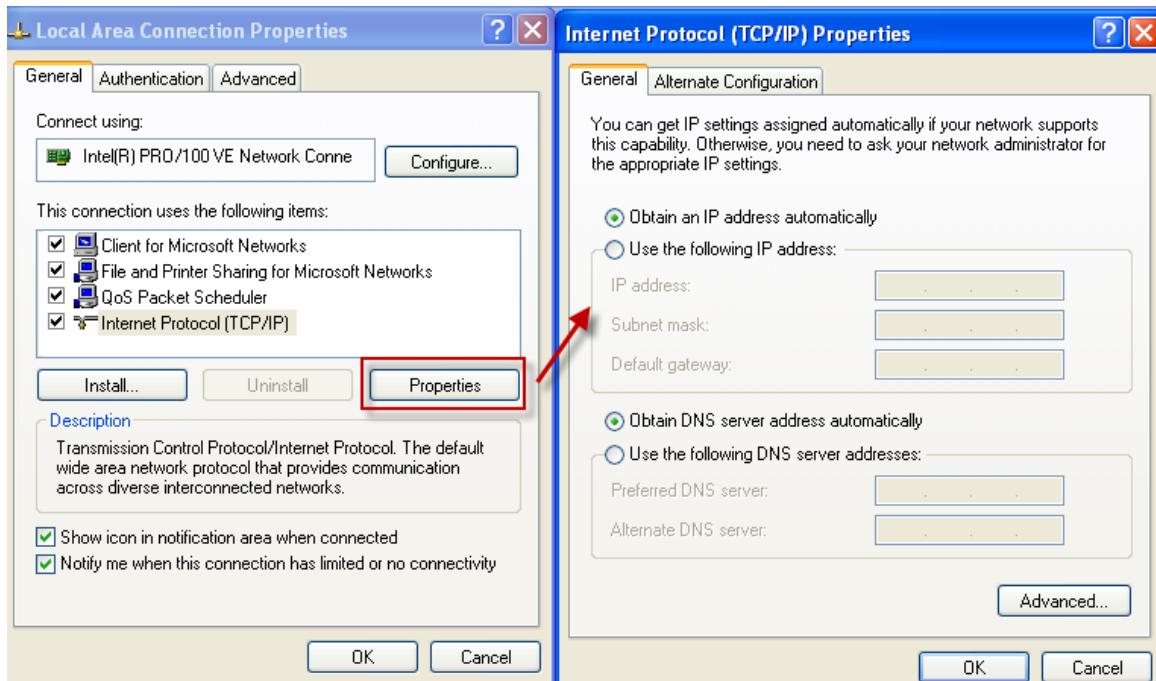
Set up your workstation

(1) Ethernet connection

To connect your computer to the P-661HNU-Fx's LAN port, the computer must have an Ethernet adapter card installed. For connecting a single computer to the P-661HNU-Fx, we use a Ethernet cable.

(2) TCP/IP configuration

In most cases, the IP address of the computer is assigned by the ISP dynamically so you have to configure the computer as a DHCP client which obtains the IP from the ISP using DHCP protocol. The ISP may also provide the gateway, DNS via DHCP if they are available. Otherwise, please enter the static IP addresses for all that the ISP gives to you in the network TCP/IP settings. For Windows, we check the option '**Obtain an IP address automatically**' in its TCP/IP setup, please see the example shown below.



Setup your P-661HNU-Fx under bridge mode

The following procedure shows you how to configure your P-661HNU-Fx as bridge mode. We will use Web Configurator to guide you through the related menu.

1. Retrieve Prestige Web

Please enter the LAN IP address of the Prestige router in the URL location to retrieve the web screen from the Prestige. The default LAN IP of the Prestige is 192.168.1.1. See the example below. Note that you can either use <http://192.168.1.1>



2. Login first

The default password is the default SMT password, '**1234**'.

- (1) Configure P-661HNU-Fx as bridge mode and configure Internet setup parameters in Web Configurator, Advanced Setup, **Network Setting-> Broadband**.

Click '**Add new WAN Interface**'

#	Name	Type	Mode	Enca...	VPI	VCI	Vlan...	Vlan...	ATM...	IGMP...	NAT	Defa...	Modify
1	ADSL...	ADSL	Routi...	IPoE	0	33	N/A	N/A	UBR	Enabl...	Enabl...	Yes	

Configure Internet Setup

Add New WAN Interface

General

Name :

Type :

Mode :

Bridge Group
Select LAN/WLAN port(s) you wish to together with this WAN interface

Available LAN/WLAN Port(s)	Bridged LAN/WLAN Port(s)
<input type="text" value="LAN1"/> <input type="text" value="LAN2"/> <input type="text" value="LAN3"/> <input type="text" value="LAN4"/> <input type="text" value="ZyXEL_05"/>	<input type="text"/>

Buttons: Add >> | Remove <<

Buttons: Apply | Back

Add New WAN Interface

Select LAN/WLAN port(s) you wish to together with this WAN interface

Available LAN/WLAN Port(s)	Bridged LAN/WLAN Port(s)
<input type="text" value="LAN1"/> <input type="text" value="LAN2"/> <input type="text" value="LAN3"/> <input type="text" value="LAN4"/> <input type="text" value="ZyXEL_05"/>	<input type="text"/>

ATM PVC Configuration

VPI[0-255] :	<input type="text" value="8"/>
VCI[32-65535] :	<input type="text" value="34"/>
Encapsulation Mode :	<input type="text" value="LLC/SNAP-BRIDGING"/>
Service Category :	<input type="text" value="UBR Without PCR"/>

Buttons: Apply | Back

Key Settings:

Option	Description
Encapsulation Mode	Select the correct Encapsulation type that your ISP supports. For example, LLC/SNAP-BRIDGING.
VPI & VCI	Specify a VPI (Virtual Path Identifier) and a VCI (Virtual Channel)

number	Identifier) given to you by your ISP.
--------	---------------------------------------

(2) Turn off DHCP Server and configure a LAN IP for the P-661HNU-Fx in Web Configurator, Advanced Setup, **Network Setting -> Home Networking -> LAN Setup**. We use 192.168.1.1 as the LAN IP for P-661HNU-Fx in this case:

Step 1: Disactive DHCP Server and apply it:

Step 2: Assign an IP to the LAN Interface of P-661HNU-Fx, e.g.: 192.168.1.1:

2. Internet Access Using P-661HNU-Fx under Routing mode

For most Internet users having multiple computers want to share an Internet account for Internet access, they have to install an Internet sharing device, like a router. In this case, we use the P-661HNU-Fx which works as a general Router plus an ADSL Modem.

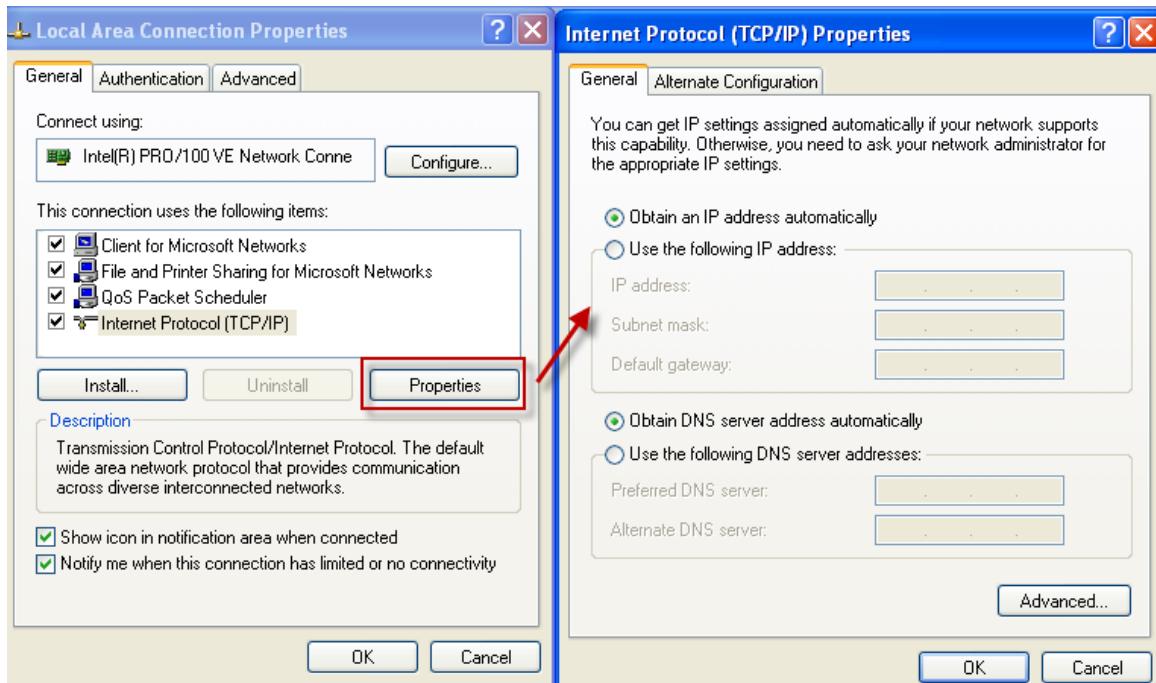
Set up your workstation

(1) Ethernet connection

Connect the LAN ports of all computers to the LAN Interface of P-661HNU-Fx using Ethernet cable.

(2) TCP/IP configuration

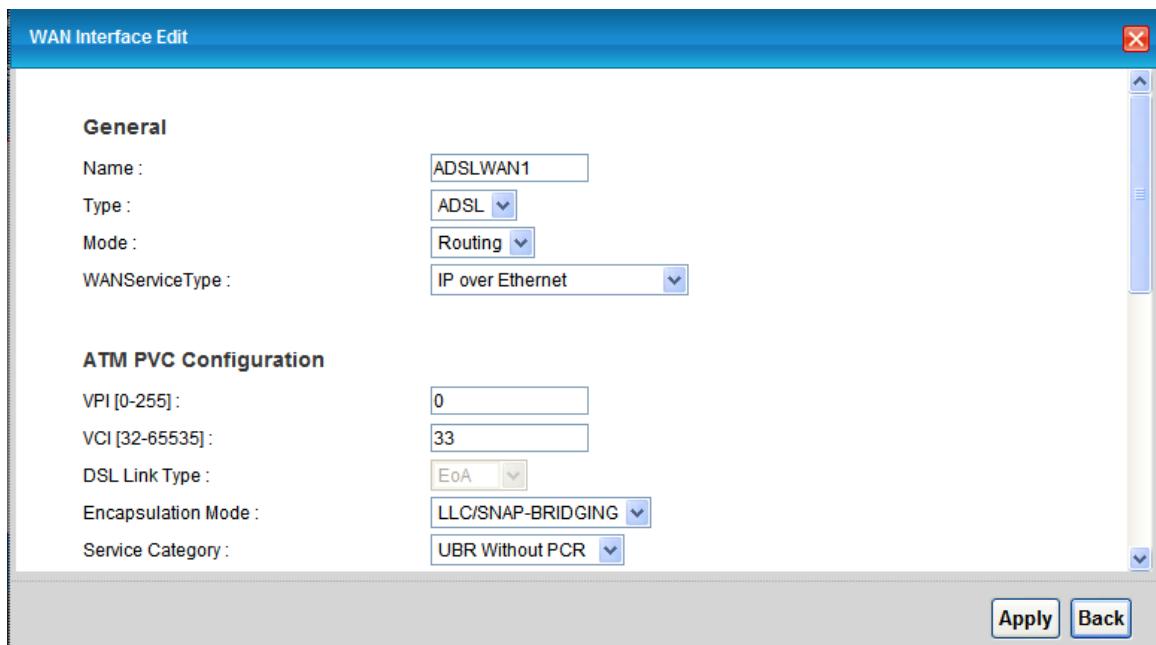
Since the P-661HNU-Fx is set to DHCP server as default, so you need only to configure the workstations as the DHCP clients in the networking settings. In this case, the IP address of the computer is assigned by the P-661HNU-Fx. The P-661HNU-Fx can also provide the DNS to the clients via DHCP if it is available. For this setup in Windows, we check the option '**Obtain an IP address automatically**' in its TCP/IP setup. Please see the example shown below.



Set up your P-661HNU-Fx under routing mode

The following procedure shows you how to configure your P-661HNU-Fx as Routing mode for routing traffic. We will use Web Configurator to guide you through the related menu.

- (1) Configure P-661HNU-Fx as routing mode and configure Internet setup parameters in Web Configurator, Advanced Setup, **Network Setting-> Boradband**.



Key Settings:

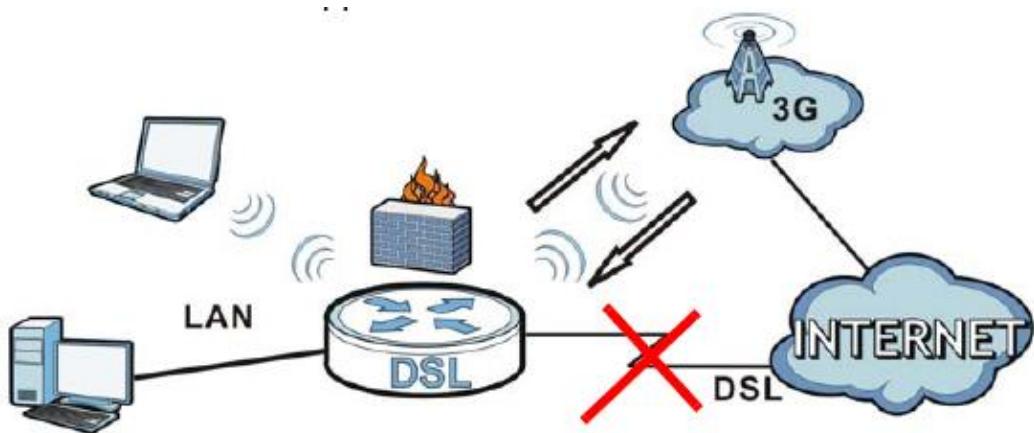
Option	Description
WANServiceType	Select the correct Encapsulation type that your ISP supports. For example, IP over Ethernet.
Encapsulation Mode	Select the correct Multiplexing type that your ISP supports. For example, LLC/SNAP-BRIDGING.
VPI & VCI number	Specify a VPI (Virtual Path Identifier) and a VCI (Virtual Channel Identifier) given to you by your ISP.
IP Address	Set to Obtain an IP Adress Automatically if the ISP provides the IP for the P-661HNU-Fx dynamically. Otherwise, set to Static IP Adress and enter the IP in the IP Address field.

(2) Configure a LAN IP for the P-661HNU-Fx and the DHCP settings in Web Configurator, Advanced Setup, **Network Setting-> Home Networking -> LAN Setup.**

3. Internet Access Using 3G Backup

The USB port allows you to wirelessly connect to a 3G network to get Internet access by attaching a 3G wireless dongle. P-661HNU-Fx switches to the 3G wireless WAN connection if the wired DSL connection fails. And it can automatically change back to the wired DSL connection when it is available.

Currently, the 3G cards you can use in the ZyXEL Device are Huawei E220 and E270.



Configuration:

3G Backup Configuration (Top Screenshot):

- 3G Backup: Enable 3G Backup
- Card Description: N/A
- Username: (Optional)
- Password: (Optional)
- PIN: (Optional) Only for unlock PIN next time
(PIN remaining authentication times: N/A)
- Dial String:

Network Setting Configuration (Bottom Screenshot):

- Connection: Nailed Up
- Obtain an IP Address Automatically
- Use the following static IP address
- Obtain DNS info dynamically
- Use the following static DNS IP address
- Primary DNS Server:
- Secondary DNS Server:

The following table describes the labels in this screen.

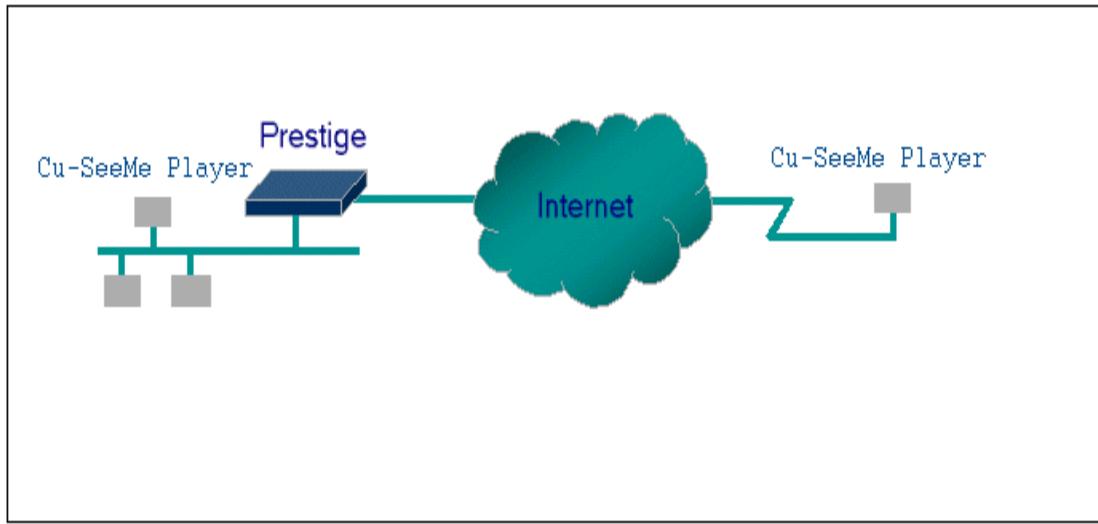
Option	Description
3G Backup	Select this option to have the ZyXEL Device use 3G connection as your WAN or a backup when the wired WAN connection fails.
Card Description	This field displays the manufacturer and model name of your 3G card if you inserted one in the ZyXEL Device. Otherwise, it displays N/A .
Username	Type the user name (of up to 70 ASCII Printable characters) given to you by your service provider.
Password	Type the password (of up to 70 ASCII Printable characters) associated with the user name above.

	A PIN (Personal Identification Number) code is a key to a 3G card. Without the PIN code, you cannot use the 3G card.
PIN	If your ISP enabled PIN code authentication, enter the 4-digit PIN code (0000 for example) provided by your ISP. If you enter the PIN code incorrectly, the 3G card may be blocked by your ISP and you cannot use the account to access the Internet. If your ISP disabled PIN code authentication, leave this field blank.
Dial String	Enter the pphone number (dial string) used to dial up a connection to your service provider's base station. Your ISP should provide the phone number. For example, *99# is the dial string to establish a GPRS or 3G connection in Taiwan.
APN Code	Enter the APN (Access Point Name) provided by your service provider. Connections with different APNs may provide different services (such as Internet access or MMS (Multi-Media Messaging Service)) and charge method. You can enter up to 31 ASCII printable characters. Spaces are allowed.
Connection	Select Nailed-UP if you do not want the connection to time out. Select On-Demand if you do not want the connection up all the time and apecify an idle time-out in the Max Idle Timeout field.
Obtain an IP Address Automatically	Select this option If your ISP did not assige you a fixed IP address.
Use the following static IP address	Select this option If the ISP assigned a fixed IP address.
IP Address	Enter your WAN IP address in this field if you selected Use the following static IP address .
Obtain DNS info dynamically	Select this to have the ZyXEL Device get the DNS server addresses from the ISP automatically
Use the following static DNS IP address	Select this to have the ZyXEL Device use the DNS server addresses you configure manually.
Primary DNS server	Enter the first DNS server address assigned by the ISP.

Secondary DNS server	Enter the second DNS server address assigned by the ISP.
Apply	Click Apply to save your changes back to the ZyXEL Device.
Cancel	Click Cancel to return to the previous configuration.

4. SUA Notes

Tested SUA/NAT Applications (e.g., Cu-SeeMe, ICQ, NetMeeting)



Introduction

Generally, SUA makes your LAN appear as a single machine to the outside world. LAN users are invisible to outside users. However, some applications such as Cu-SeeMe, and ICQ will need to connect to the local user behind the P-661HNU-Fx. In such case, a SUA server must be configured to forward the incoming packets to the true destination behind SUA. After the required server are configured in Web Configurator, Advanced Setup, **Network Setting-> NAT -> Port Forwarding**, the internal server or client applications can be accessed by using the P-661HNU-Fx's **WAN IP Address**.

SUA Supporting Table

The following are the required Web Configurator, Advanced Setup, **Network Setting -> NAT -> Port Forwarding** for the various applications running SUA mode.

ZyXEL SUA Supporting Table¹

Application	Required Settings in Port Forwarding	
	Port/IP	Outgoing Connection
WWW	None	80/client IP

FTP	None	21/client IP
TELNET	None	23/client IP (and active Telnet service from WAN)
POP3	None	110/client IP
SMTP	None	25/client IP
mIRC	None for Chat. For DCC, please set Default/Client IP	.
Windows PPTP	None	1723/client IP
ICQ 99a	None for Chat. For DCC, please set: ICQ -> preference -> connections -> firewall and set the firewall time out to 80 seconds in firewall setting.	Default/client IP
ICQ 2000b	None for Chat	None for Chat
ICQ Phone 2000b	None	6701/client IP
Cornell 1.1 Cu-SeeMe	None	7648/client IP
White Pine 3.1.2 Cu-SeeMe ²	7648/client IP & 24032/client IP	Default/client IP
White Pine 4.0 Cu-SeeMe	7648/client IP & 24032/client IP	Default/client IP
Microsoft NetMeeting 2.1 & 3.01 ³	None	1720/client IP 1503/client IP
Cisco IP/TV 2.0.0	None	.
RealPlayer G2	None	.
VDOLive	None	.
Quake1.06 ⁴	None	Default/client IP
Quakell2.30 ⁵	None	Default/client IP
Quakell1.05 beta	None	.
StartCraft.	6112/client IP	.
Quick Time 4.0	None	.
pcAnywhere 8.0	None	5631/client IP 5632/client IP 22/client IP
IPsec (ESP tunneling mode)	None (one client only)	Default/Client

Microsoft Messenger Service 3.0	6901/client IP	6901/client IP
Microsoft Messenger Service 4.6/ 4.7/ 5.0/… (none UPnP) ⁶	None for Chat, File transfer ,Video and Voice	None for Chat, File transfer, Video and Voice
Net2Phone	None	6701/client IP
Network Time Protocol (NTP)	None	123 /server IP
Win2k Terminal Server	None	3389/server IP
Remote Anything	None	3996 - 4000/client IP
Virtual Network Computing (VNC)	None	5500/client IP 5800/client IP 5900/client IP
AIM (AOL Instant Messenger)	None for Chat and IM	None for Chat and IM
e-Donkey	None	4661 - 4662/client IP
POLYCOM Video Conferencing	None	Default/client IP
iVISTA 4.1	None	80/server IP
Microsoft Xbox Live ⁷	None	N/A

¹ Since SUA enables your LAN to appear as a single computer to the Internet, it is not possible to configure similar servers on the same LAN behind SUA.

² Because White Pine Cu-SeeMe uses dedicate ports (port 7648 & port 24032) to transmit and receive data, therefore only one local Cu-SeeMe is allowed within the same LAN.

³ In SUA mode, only one local NetMeeting user is allowed because the outsiders can not distinguish between local users using the same internet IP.

⁴ Certain Quake servers do not allow multiple users to login using the same unique IP, so only one Quake user will be allowed in this case. Moreover, when a Quake server is configured behind SUA, P-661HNU-Fx will not be able to provide information of that server on the internet.

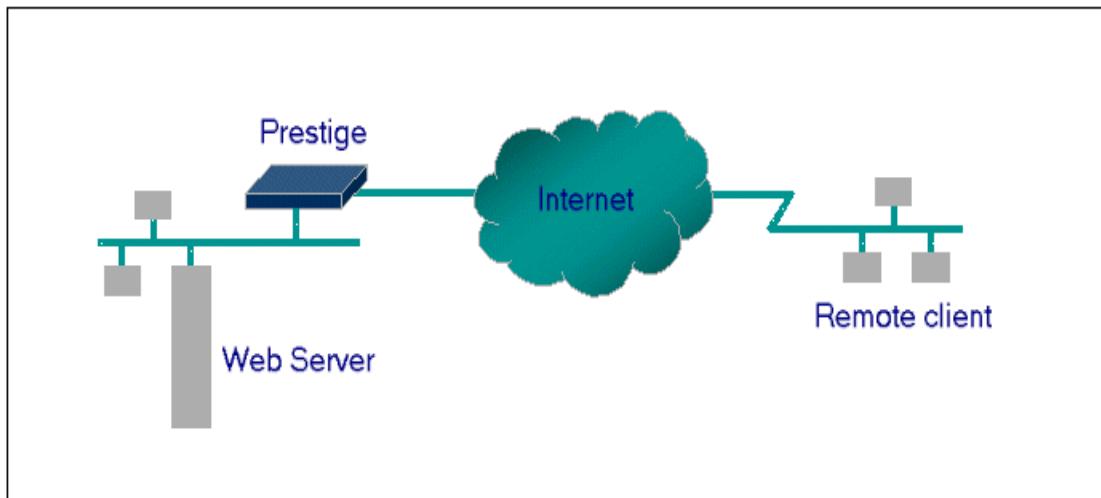
⁵ Quake II has the same limitations as that of Quake I.

⁶ P-661HNU-Fx supports MSN Messenger 4.6/ 4.7/ 5.0/… video/ voice pass-through NAT. In addition, for the Windows OS supported UPnP (Universal Plug and Play), such as Windows XP and Windows ME, UPnP supported in P-661HNU-Fx is an alternative solution to pass through MSN Messenger video/ voice traffic. For more detail, please refer to UPnP application note.

⁷ P-661HNU-Fx support Microsoft Xbox Live with factory default configuration.

Configurations

Configure an Internal Server behind SUA



Introduction

If you wish, you can make internal servers (e.g., Web, ftp or mail server) accessible for outside users, even though SUA makes your LAN appear as a single machine to the outside world. A service is identified by the port number. Also, since you need to specify the IP address of a server behind the P-661HNU-Fx, a server must have a fixed IP address and not be a DHCP client whose IP address potentially changes each time P-661HNU-Fx is powered on.

In addition to the servers for specific services, SUA supports a default server. A service request that does not have a server explicitly designated for is forwarded to the default server. If the default server is not defined, the service request is simply discarded.

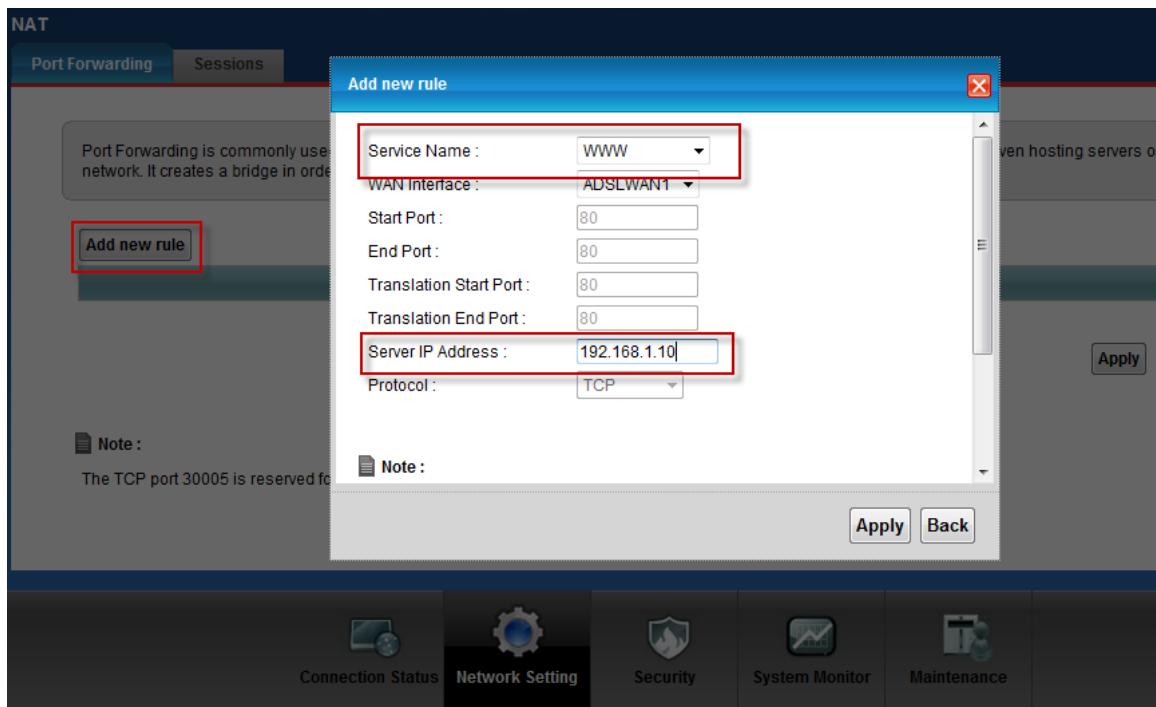
Configuration

To make a server visible to the outside world, specify the port number of the service and the inside address of the server in Web Configurator, Advanced Setup, **Network Setting -> NAT -> Port Forwarding**. The outside users can access the local server using the P-661HNU-Fx's **WAN IP** address which can be obtained from Web Configurator, **Connection Status -> System Info -> WAN Information**.

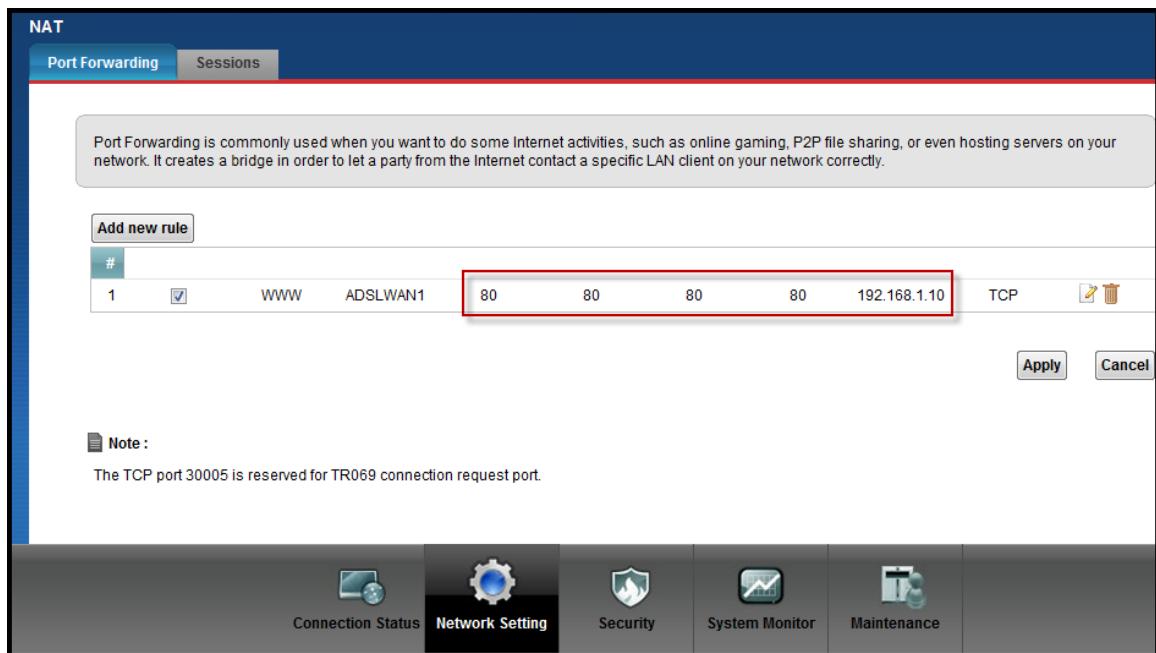
For example:

Configuring an internal Web server for outside access (suppose the Server IP Address is 192.168.1.10) :

(1) Fill in the service name and server IP Address, press button 'Add new rule'



(2) If add successfully, the Web Configurator will display message 'Configuration updated successfully' at the bottom. You can see the port forwarding rule on the same page, the default port for Web Server is 80:



(3) If you want to change the port for Web Server, you could press button 'Edit' on corresponding rule, then modify and apply it.

Default port numbers for some services

Service	Port Number
FTP	21
Telnet	23
E-mail	25
PPTP	1723
www-http (Web)	80
IPSec	500
TFTP	69

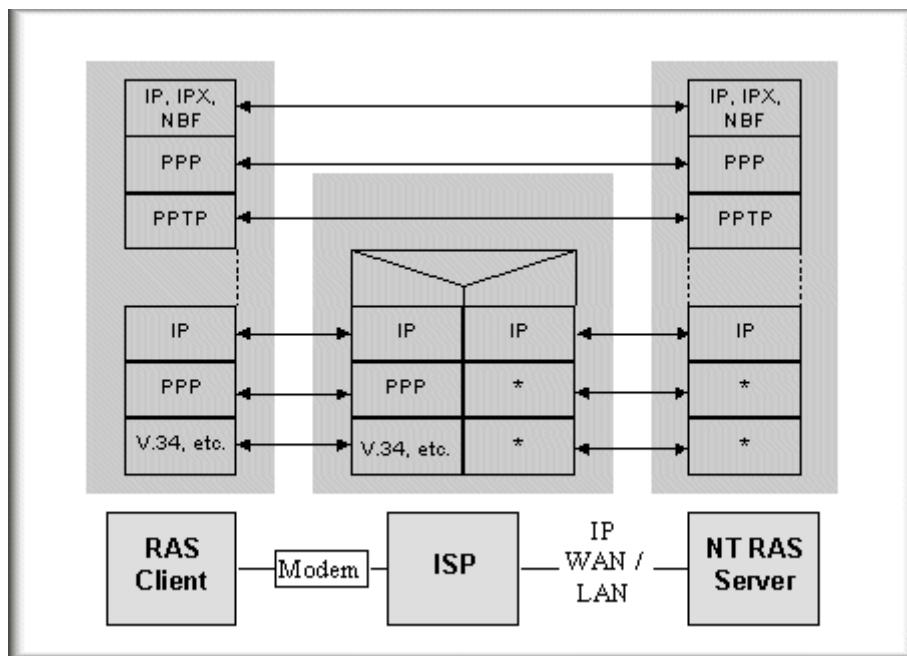
Configure a PPTP server behind SUA

Introduction

PPTP is a tunneling protocol defined by the PPTP forum that allows PPP packets to be encapsulated within Internet Protocol (IP) packets and forwarded over any IP network, including the Internet itself.

In order to run the Windows 9x PPTP client, you must be able to establish an IP connection with a tunnel server such as the Windows NT Server 4.0 Remote Access Server.

Windows Dial-Up Networking uses the Internet standard Point-to-Point (PPP) to provide a secure, optimized multiple-protocol network connection over dial-up telephone lines. All data sent over this connection can be encrypted and compressed, and multiple network level protocols (TCP/IP, NetBEUI and IPX) can be run correctly. Windows NT Domain Login level security is preserved even across the Internet.



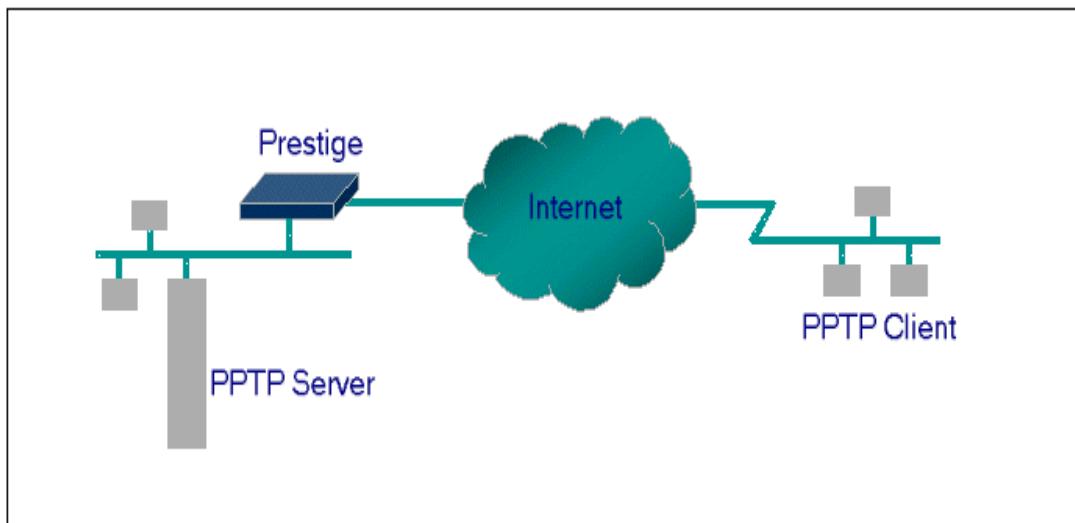
Window98 PPTP Client / Internet / NT RAS Server Protocol Stack

PPTP appears as new modem type (Virtual Private Networking Adapter) that can be selected when setting up a connection in the Dial-Up Networking folder. The VPN Adapter type does not appear elsewhere in the system. Since PPTP encapsulates its data stream in the PPP protocol, the VPN requires a second dial-up adapter. This second dial-up adapter for VPN is added during the installation phase of the Upgrade in addition to the first dial-up adapter that provides PPP support for the analog or ISDN modem.

The PPTP is supported in Windows NT and Windows 98 already. For Windows 95, it needs to be upgraded by the Dial-Up Networking 1.2 upgrade.

Configuration

This application note explains how to establish a PPTP connection with a remote private network in the P-661HNU-Fx SUA case. In ZLD, all PPTP packets can be forwarded to the internal PPTP Server (WinNT server) behind SUA. The port number of the PPTP has to be entered in the Web Configurator, Advanced Setup, **Network Setting-> NAT -> Port Forwarding** on P-661HNU-Fx to forward to the appropriate private IP address of Windows NT server.



Example

The following example shows how to dial to an ISP via the P-661HNU-Fx and then establish a tunnel to a private network. There will be three items that you need to set up for PPTP application, these are PPTP server (WinNT), PPTP client (Win9x) and the P-661HNU-Fx.

(1) PPTP server setup (WinNT)

- Add the VPN service from Control Panel ->Network
- Add an user account for PPTP logged on user
- Enable RAS port
- Select the network protocols from RAS such as IPX, TCP/IP NetBEUI
- Set the Internet gateway to P-661HNU-Fx

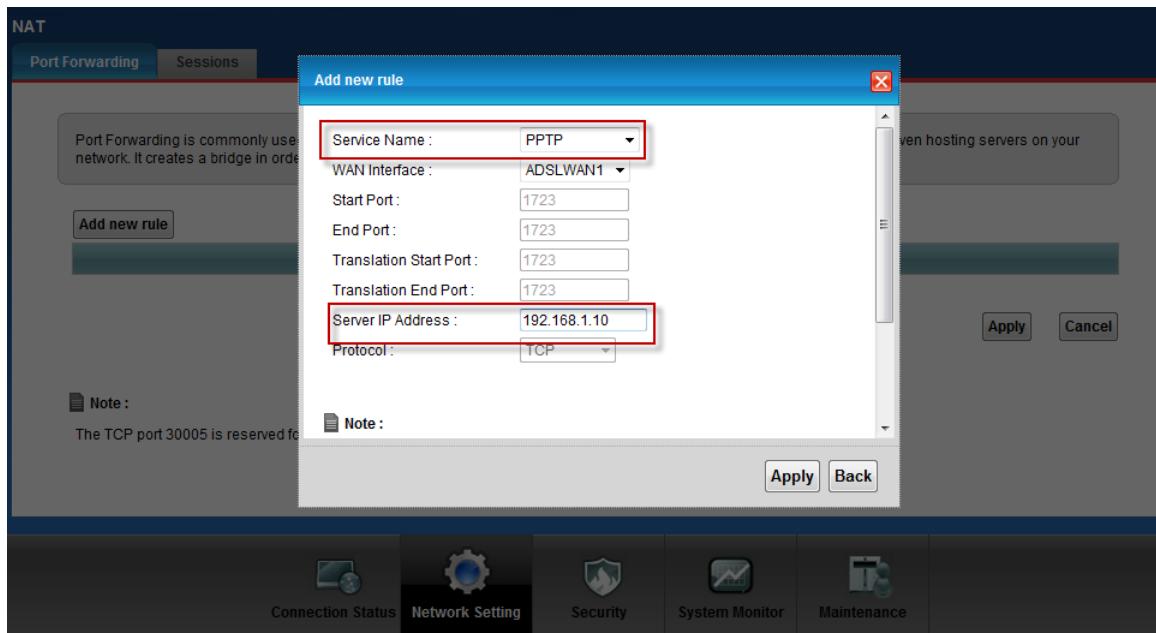
(2) PPTP client setup (Win9x)

- Add one VPN connection from Dial-Up Networking by entering the correct username & password and the IP address of the P-661HNU-Fx's Internet IP address for logging to NT RAS server.
- Set the Internet gateway to the router that is connecting to ISP

(3) P-661HNU-Fx setup

- Before making a VPN connection from Win9x to WinNT server, you need to connect P-661HNU-Fx router to your ISP first.
- Enter the IP address of the PPTP server (WinNT server) and the port number for PPTP as shown below:

Select service name as 'PPTP', fill in the Server IP Address, then press button 'Add'.



When you have finished the above settings, you can ping to the remote Win9x client from WinNT. This ping command is used to demonstrate that remote the Win9x can be reached across the Internet. If the Internet connection between two LANs is achievable, you can place a VPN call from the remote Win9x client.

For example: C:\ping 203.66.113.2

When a dial-up connection to ISP is established, a default gateway is assigned to the router traffic through that connection. Therefore, the output below shows the default gateway of the Win9x client after the dial-up connection has been established.

Before making a VPN connection from the Win9x client to the NT server, you need to know the exact Internet IP address that the ISP assigns to P-661HNU-Fx router in SUA mode and enter this IP address in the VPN dial-up dialog box. You can check this Internet IP address from PNC Monitor or S Web Configurator, **Connecting Status -> System Info -> WAN**

Information. If the Internet IP address is a fixed IP address provided by ISP in SUA mode, then you can always use this IP address for reaching the VPN server.

In the following example, the IP address '140.113.1.225' is dynamically assigned by ISP. You must enter this IP address in the 'VPN Server' dialog box for reaching the PPTP server. After the VPN link is established, you can start the network protocol application such as IP, IPX and NetBEUI.



5. Using the Dynamic DNS (DDNS)

- What is DDNS?

The DDNS service, an IP Registry provides a public central database where information such as email addresses, hostnames, IPs etc. can be stored and retrieved. This solves the problems if your DNS server uses an IP associated with dynamic IPs.

Without DDNS, we always tell the users to use the WAN IP of the P-661HNU-Fx to access the internal server. It is inconvenient for the users if this IP is dynamic. With DDNS supported by the P-661HNU-Fx, you apply a DNS name (e.g., www.zyxel.com.tw) for your server (e.g., Web server) from a DDNS server. The outside users can always access the web server using the www.zyxel.com.tw regardless of the WAN IP of the P-661HNU-Fx.

When the ISP assigns the P-661HNU-Fx a new IP, the P-661HNU-Fx must inform the DDNS server the change of this IP so that the server can update its IP-to-DNS entry. Once the IP-to-DNS table in the DDNS server is updated, the DNS name for your web server (i.e., www.zyxel.com.tw) is still usable.

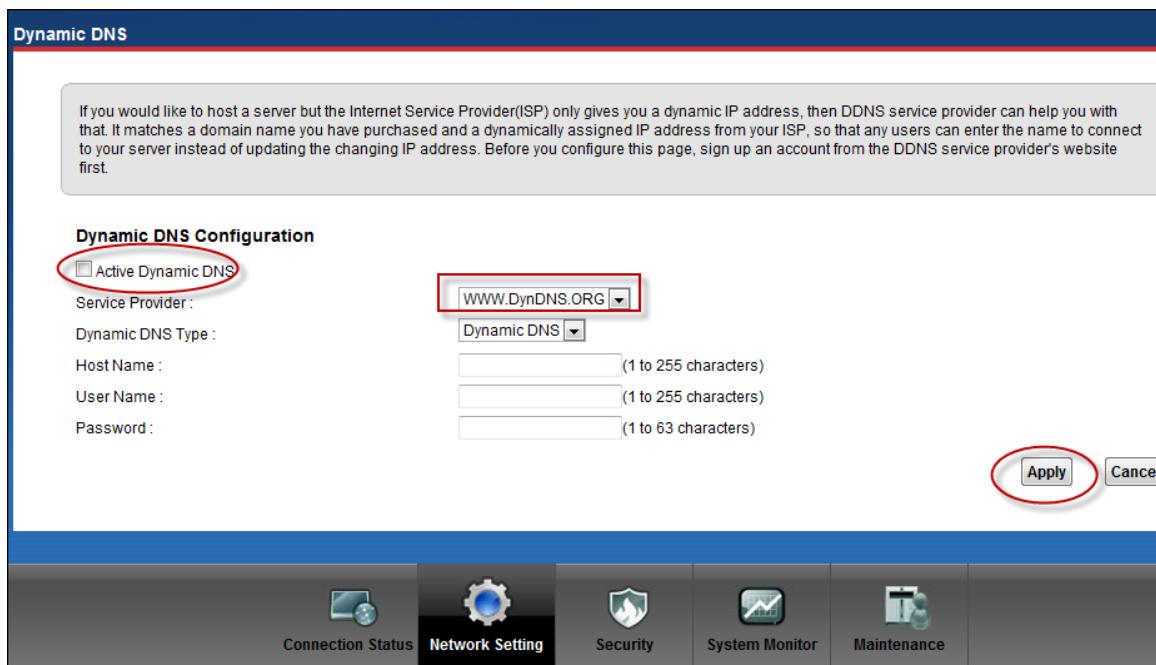
The DDNS servers the P-661HNU-Fx supports currently is WWW.DYNDNS.ORG where you apply the DNS from and update the WAN IP to.

- Setup the DDNS

1. Before configuring the DDNS settings in the P-661HNU-Fx, you must register an account from the DDNS server such as

WWW.DYNDNS.ORG first. After the registration, you have a hostname for your internal server and a password using to update the IP to the DDNS server.

2. Login Web Configurator, Advanced Setup, **Network Setting -> Dynamic DNS** Select 'Active Dynamic DNS' option:

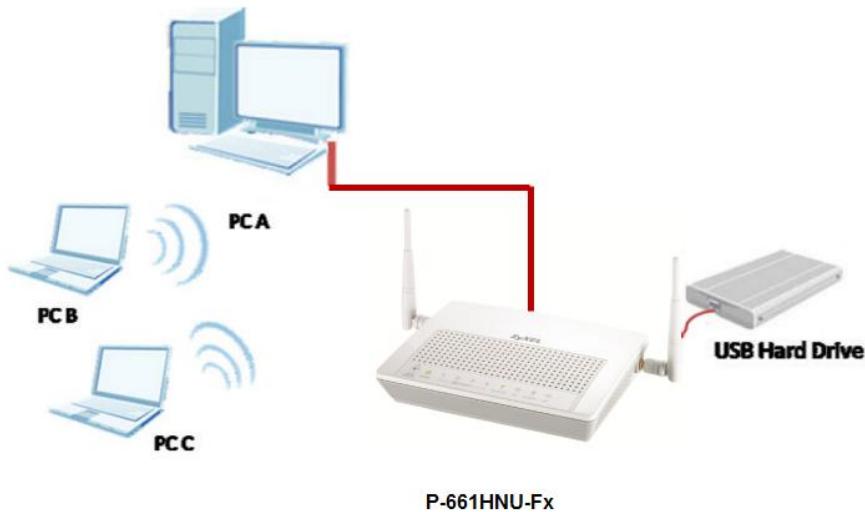


Key Settings:

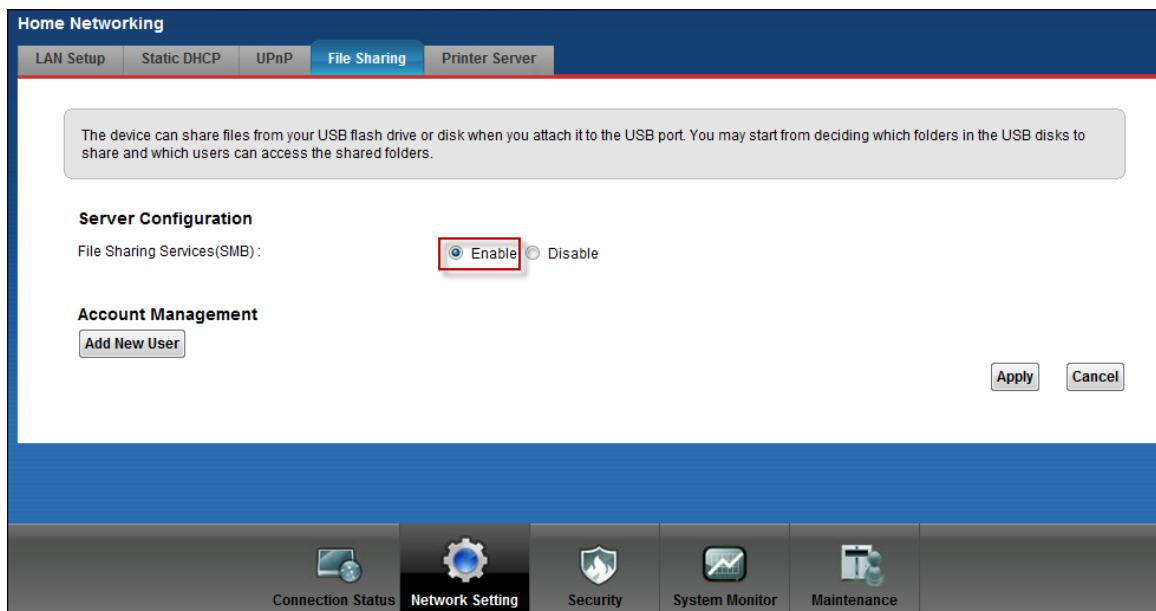
Option	Description
Service Provider	Enter the DDNS server in this field. Currently, we support WWW.DYNDNS.ORG.
Active	Toggle to 'Yes'.
Host Name	Enter the hostname you subscribe from the above DDNS server. For example, zyxel.com.tw.
User Name	Enter the user name that the DDNS server gives to you.
Password	Enter the password that the DDNS server gives to you.

6. File Sharing

Sharing files on a USB memory stick or hard drive connected to P-661HNU-Fx with other users on the network, the topology showed bellow allowing PC A, B & C to access file on a USB Hard drive.



- 1) Plug in Flash disk in USB port.
- 2) Go to **Network Setting -> Home Networking -> File sharing**
- 3) Click on “**Share Configuration**” to enable “**SMB**” function.



- 4) Click on “**Apply**”.

When File Sharing feature is enabled, P-661HNU-Fx will find the attached USB Hard Drive.

The device can share files from your USB flash drive or disk when you attach it to the USB port. You may start from deciding which folders in the USB disks to share and which users can access the shared folders.

Server Configuration

File Sharing Services(SMB) : Enable Disable

Share Directory List

Add New Share

#	Status	Share Name	Share Path	Share Description	Modify
<input checked="" type="checkbox"/>		Teclast_CoolFlash_00000001FB_1	Teclast_CoolFlash_000000001FB_1	Teclast_CoolFlash_000000001FB_1	

Account Management

Add New User

Apply **Cancel**

Connection Status **Network Setting** **Security** **System Monitor** **Maintenance**

- 5) Click on “Edit”.
- 6) Select Access Level “**Public**” to allow access to anyone who can login to the flash disk.

Home Networking

LAN Setup Static DHCP UPnP **File Sharing** Printer Server

Modify Share Directory

The device can share and which users can access the USB disks to

Server Configuration

File Sharing Services

Share Directory

Add New Share

#	Status
<input checked="" type="checkbox"/>	

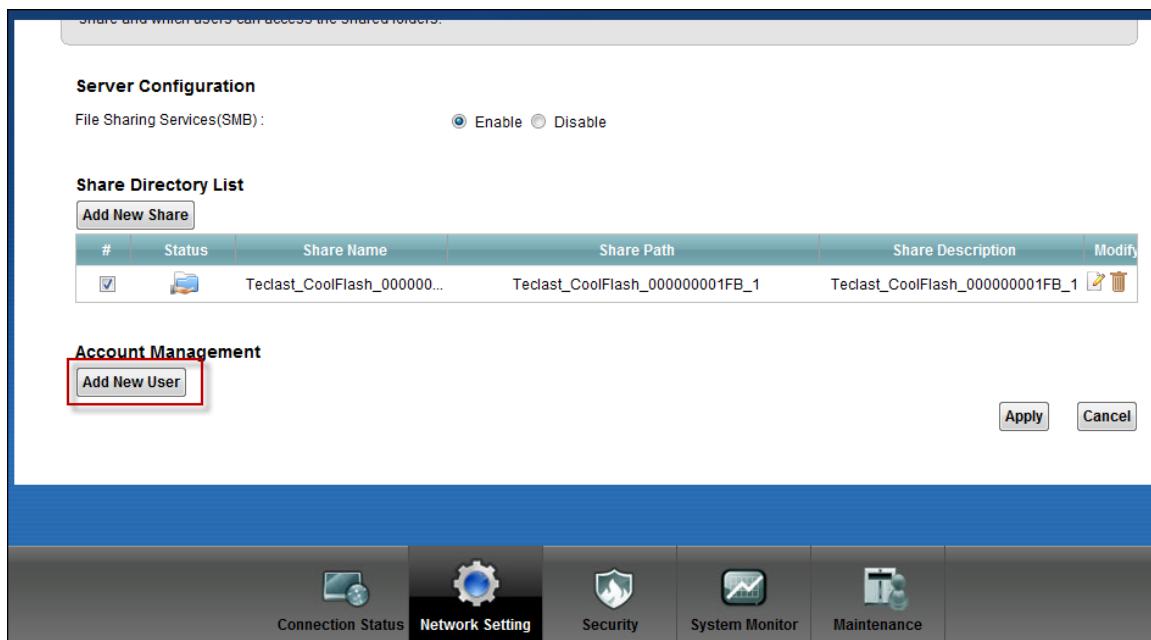
Account Management

Add New User

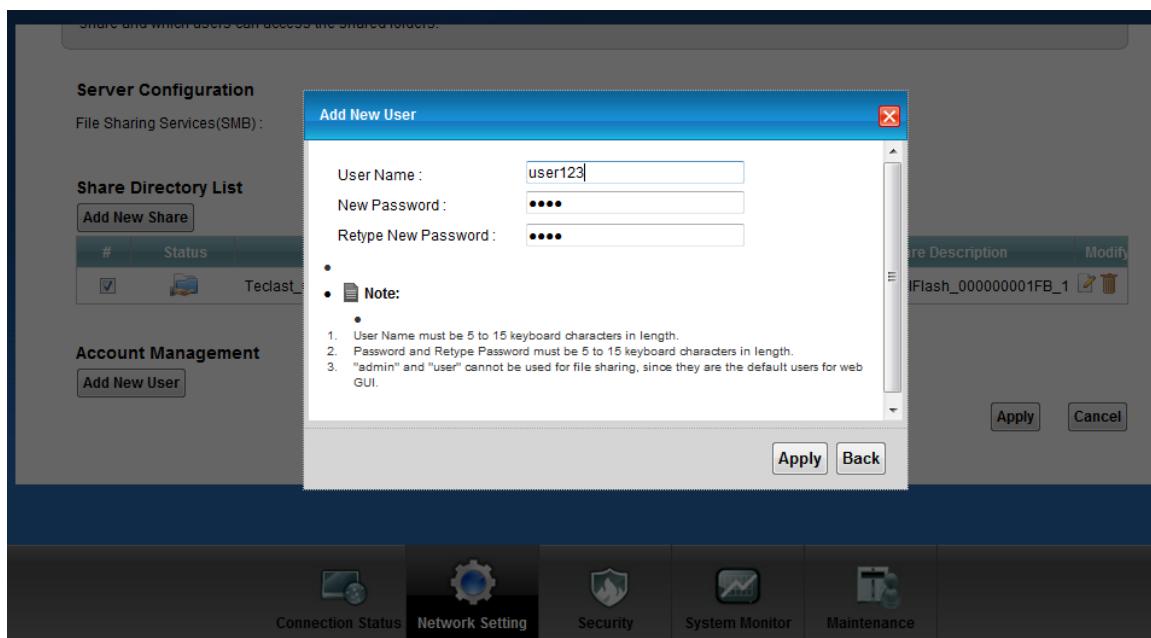
Apply **Back**

Connection Status **Network Setting** **Security** **System Monitor** **Maintenance**

- 7) Click on “**Add New User**” to create a new account for access log in.



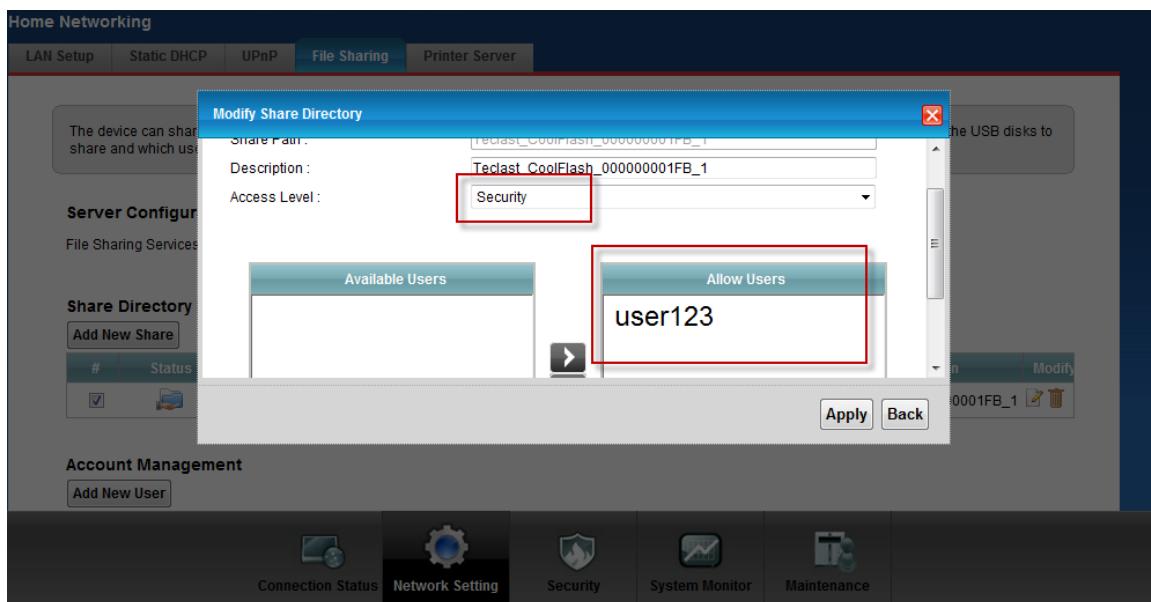
8) Enter “User Name” and “New Password”.



9) Click on “Apply”.

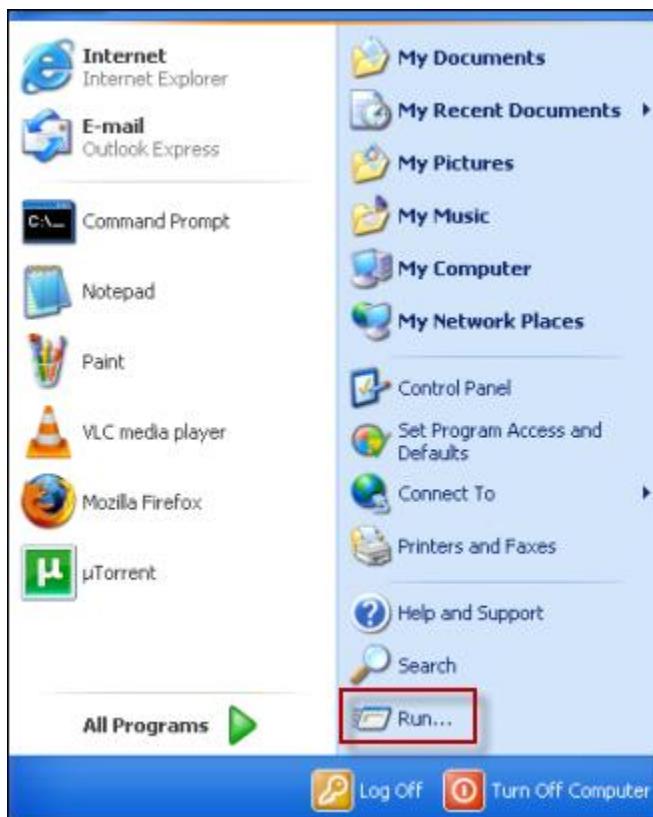


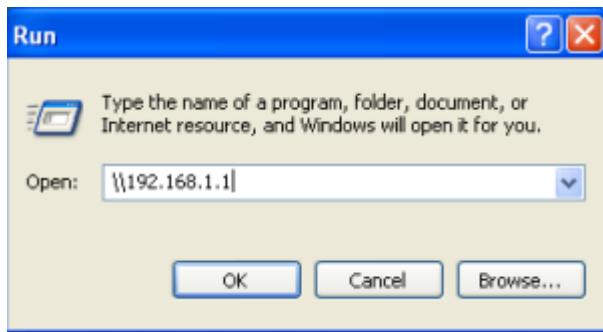
- 10) Repeat the steps 5 and 6 to change the access control level.
- 11) Select Access Level as “Security”.
- 12) Select user123 as “Allow User”.



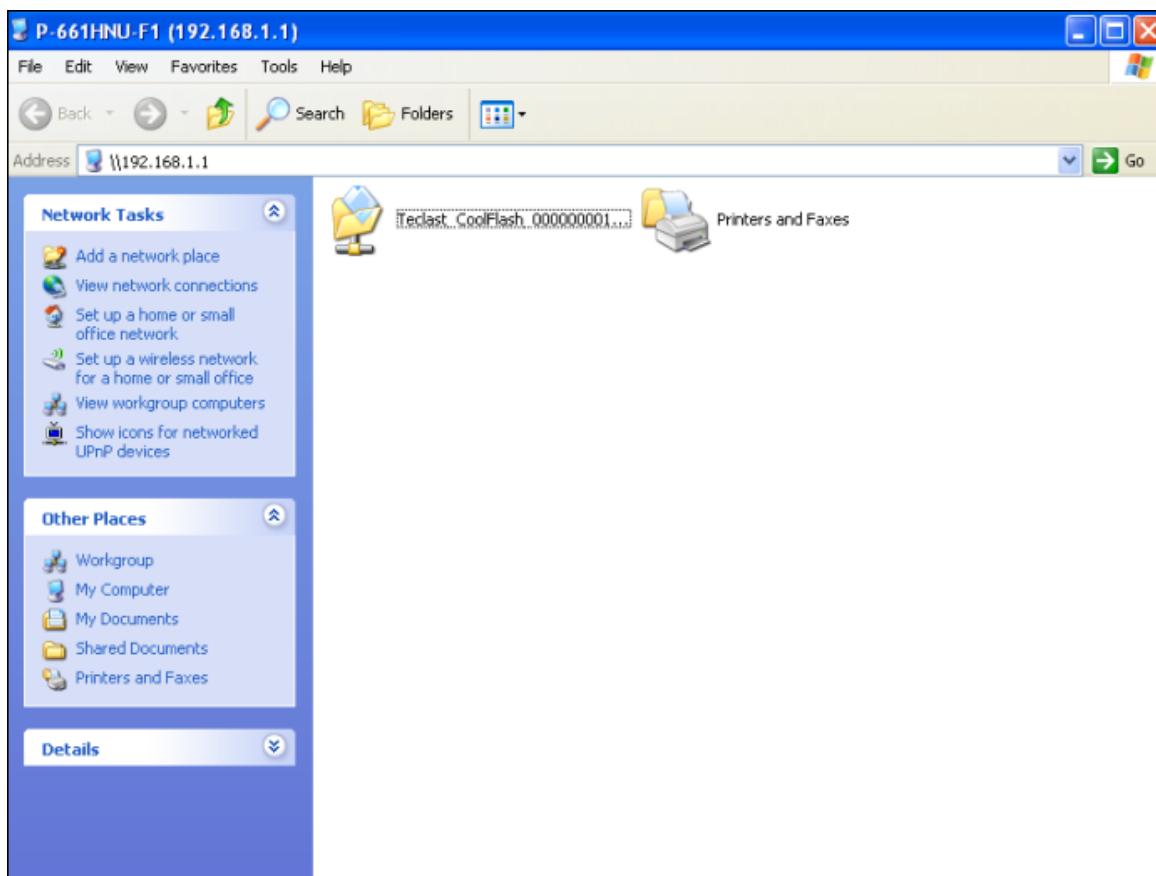
The following steps will show you how the PC A, B or C Access the USB Hard Drive from the PC.

13) Go to Windows “Run” and connect to P-661HNU-Fx.



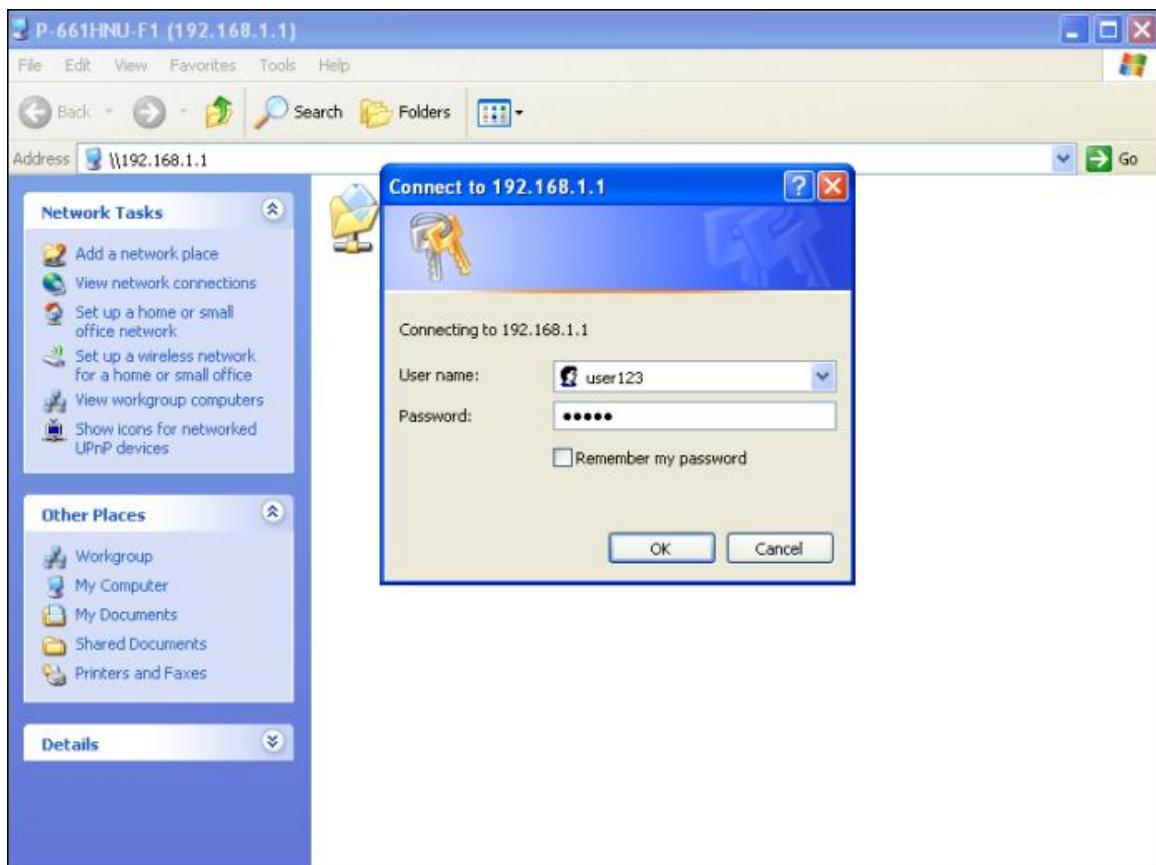


14) After connected to P-661HNU-Fx, the USB hard drive will be displayed on the screen.

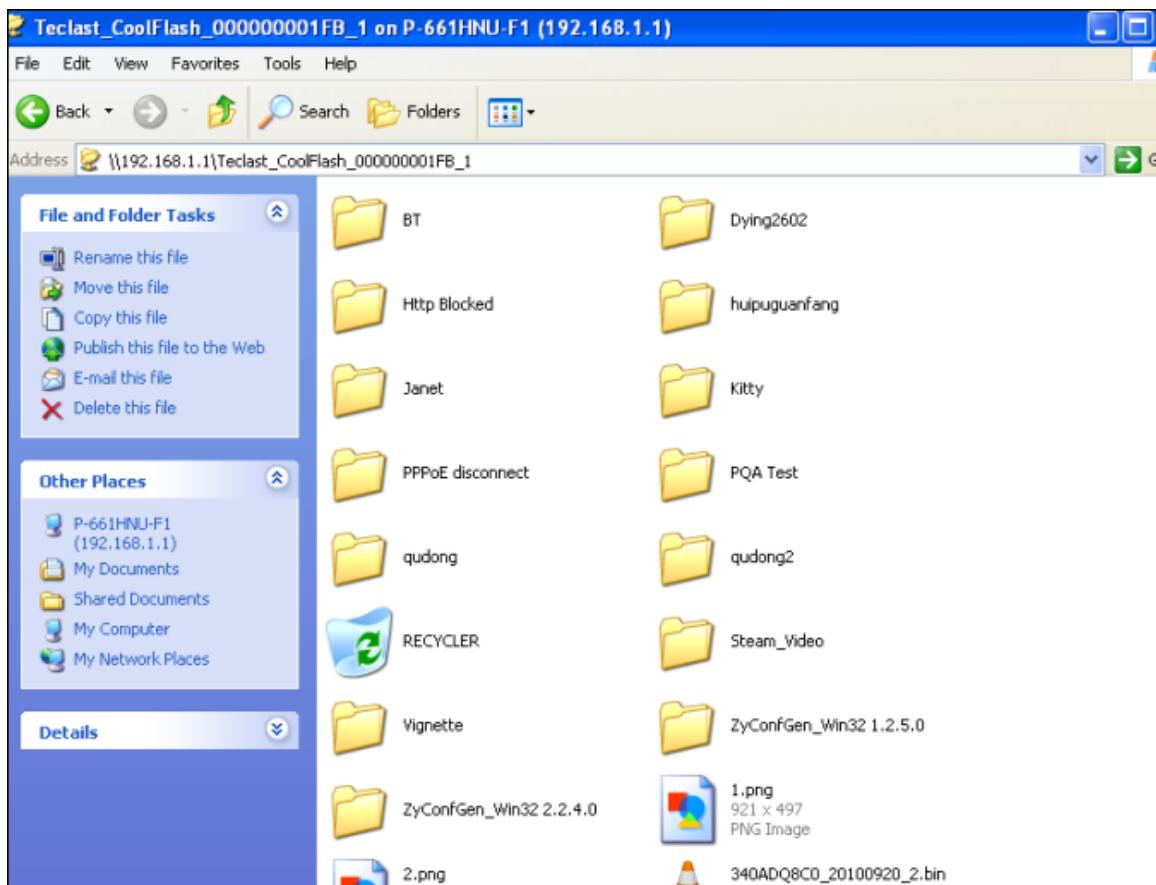


15) Click on the USB hard drive, and a pop up window will be displayed asking the login information.

Key in the user account: user123, password: xxxxx



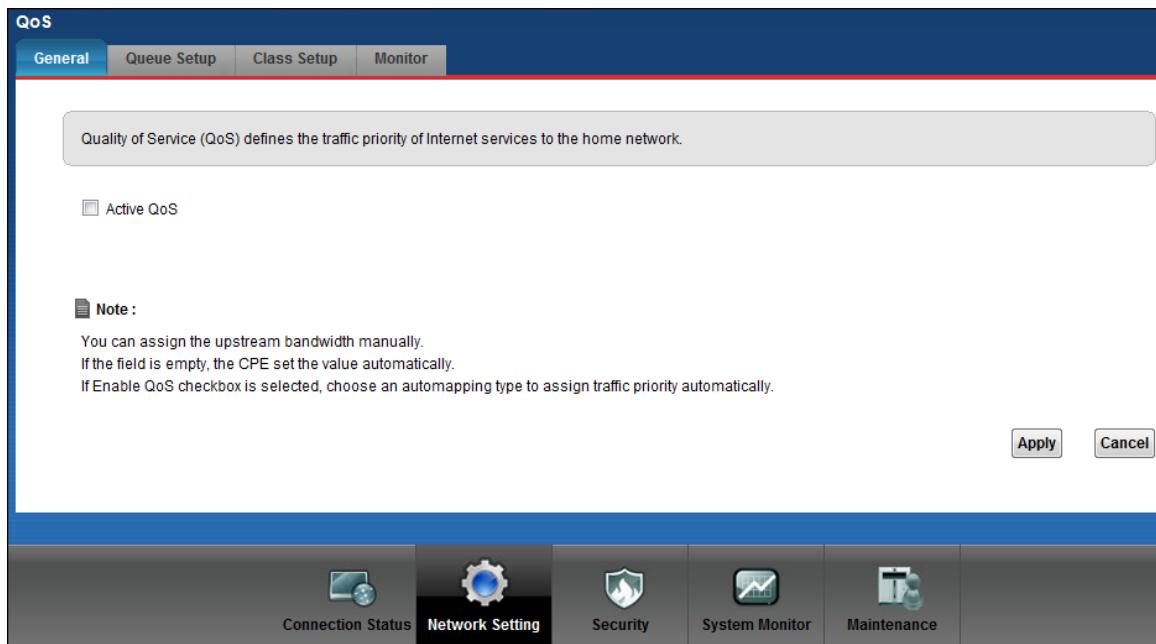
After successful log in, the content of the USB hard drive will be displayed.



7. QoS

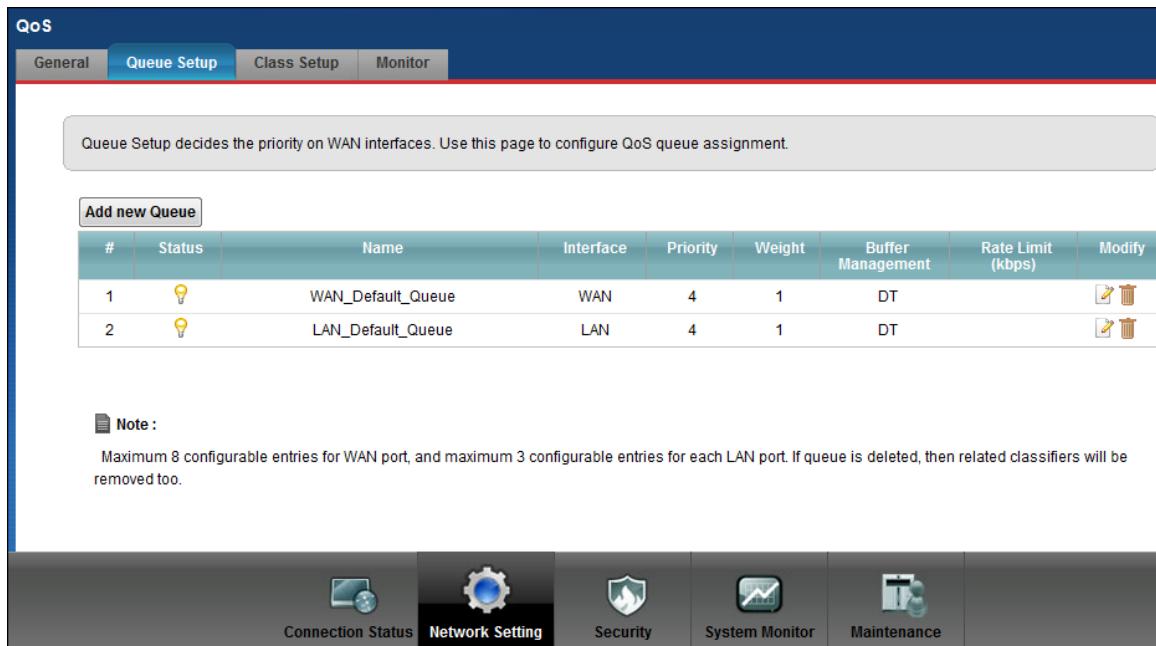
The QoS General Screen

Click **Network Setting > QoS** to open the screen as shown next. Use this screen to enable or disable QoS.

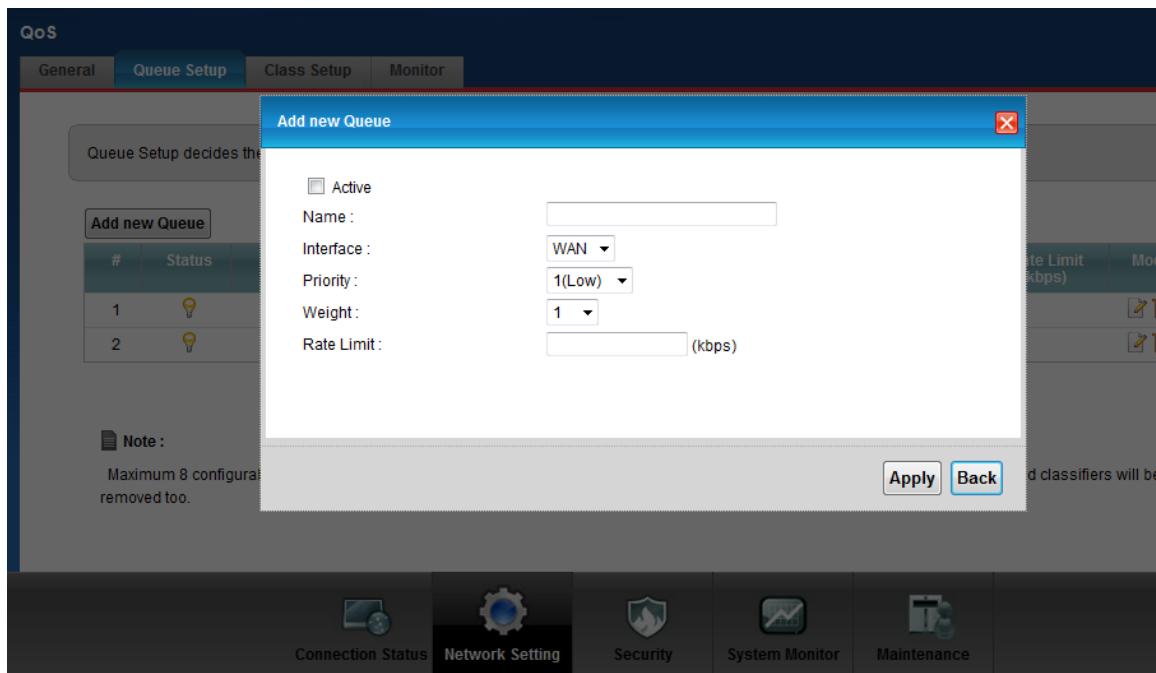


The Queue Setup Screen

Queue Setup decides the priority on WAN interfaces. Use this screen to configure QoS queue assignment.



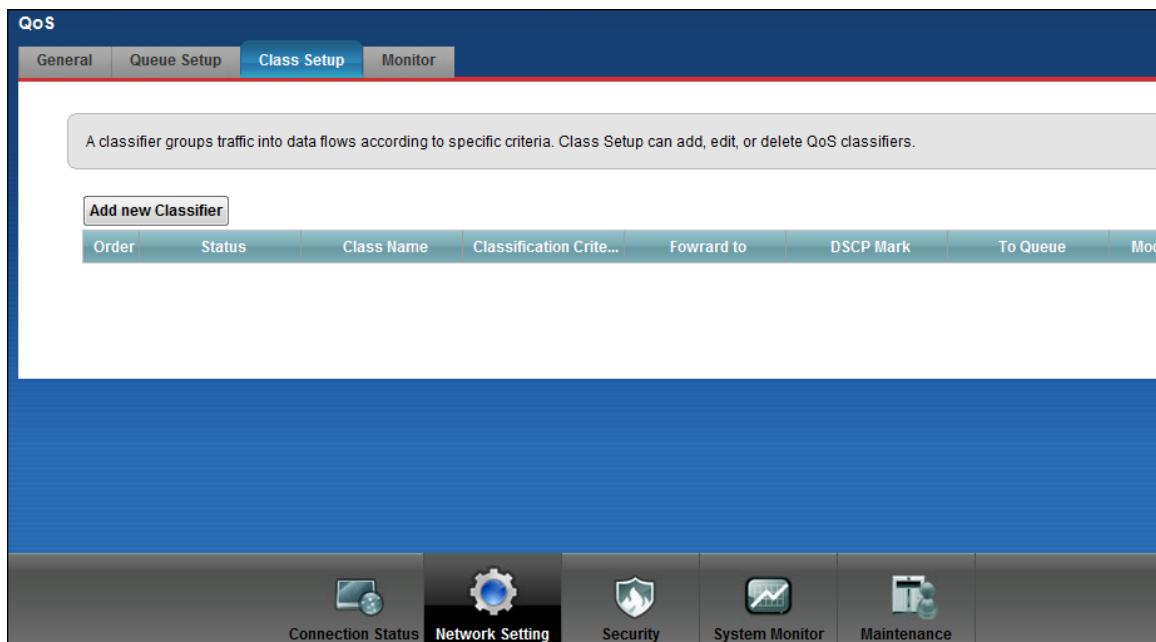
There are two default queues. One is for WAN interface, the other is for LAN interface. You could add more queues by applying 'Add new Queue' button.



The Class Setup Screen

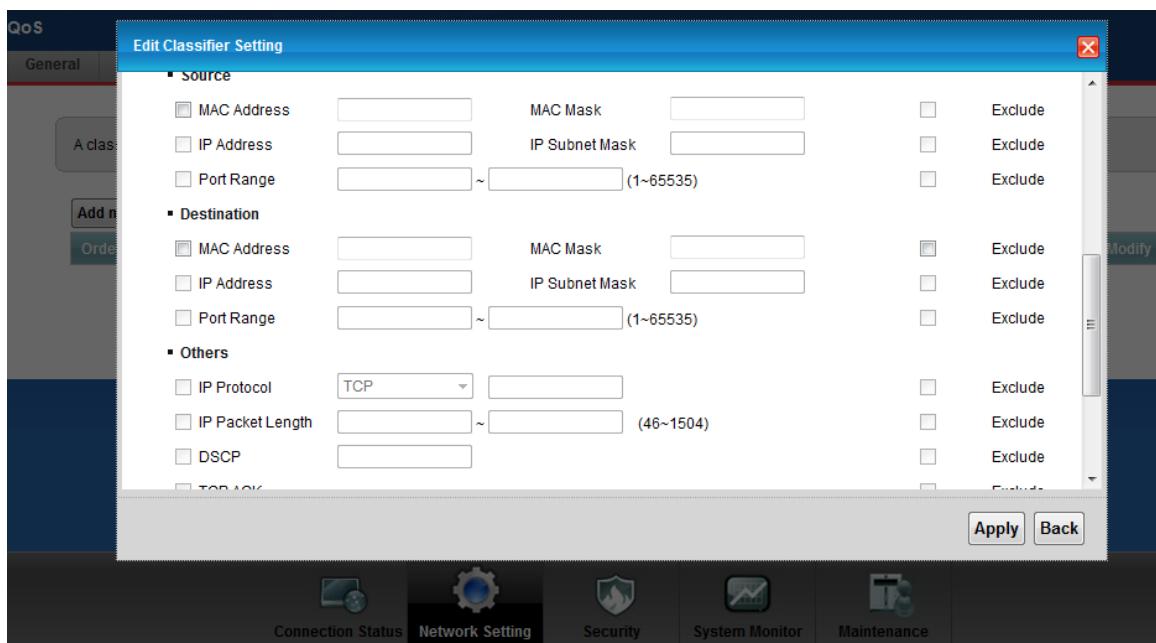
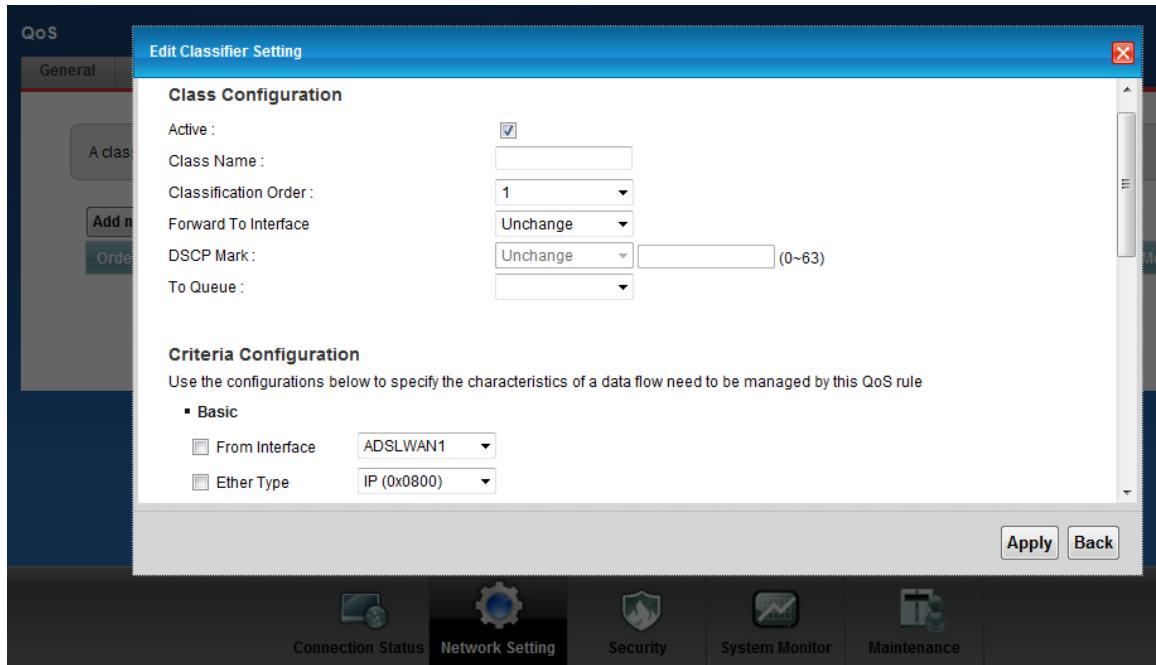
Use this screen to add, edit or delete classifiers. A classifier groups traffic into data flows according to specific criteria such as the source address, destination address, source port number, destination port number or incoming interface.

Click Network Setting -> QoS -> Class Setup



The Class Configuration Screen

Click the **Add new Classifier** button to configure a classifier.



The QoS Monitor Screen

To view the ZyXEL Device's QoS packet statistics, click **Network Setting > QoS > Monitor**. The screen appears as shown.

#	Name	Pass Rate(bps)	
1	nas1	0	
2	br0	0	

#	Name	Interface	Pass Rate(bps)	Drop Rate(bps)
1	WAN_Default_Queue	WAN	0	0
2	LAN_Default_Queue	LAN	0	0

8. Using syslog

Syslog Logging :	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Syslog Server :	0.0.0.0 (IP Address)
UDP Port :	514 (Server Port)

You can configure it in Web Configurator, Advanced Setup, **Maintenance -> Log Setting**

Key Settings:

Syslog Logging: Select Enable to active Syslog.

Syslog Server: Enter the IP address of the server that you wish to send the syslog.

UDP Port: Enter server port which you want to send the syslog on.

9. Using IP Multicast

- What is IP Multicast ?**

Traditionally, IP packets are transmitted in two ways - unicast or broadcast. Multicast is a third way to deliver IP packets to a group of hosts. Host groups are identified by class D IP addresses, i.e., those with "1110" as their higher-order bits. In dotted decimal notation, host group addresses range from 224.0.0.0 to 239.255.255.255. Among them, 224.0.0.1 is assigned to the permanent IP hosts group, and 224.0.0.2 is assigned to the multicast routers group.

IGMP (Internet Group Management Protocol) is the protocol used to support multicast groups. The latest version is version 2 (see RFC2236). IP hosts use IGMP to report their multicast group membership to any immediate-neighbor multicast routers so the multicast routers can decide if a multicast packet needs to be forwarded. At start up, the P-661HNU-Fx queries all directly connected networks to gather group membership.

After that, the P-661HNU-Fx updates the information by periodic queries. The P-661HNU-Fx implementation of IGMP is also compatible with version 1. The multicast setting can be turned on or off on Ethernet and remote nodes.

P-661HNU-Fx supports IGMP v1 ,v2 and IGMP v3 without source filtering.

- IP Multicast Setup**

Enable IGMP in P-661HNU-Fx's remote node in Web Configurator, Advanced Setup, **Network Setting-> Broadband**

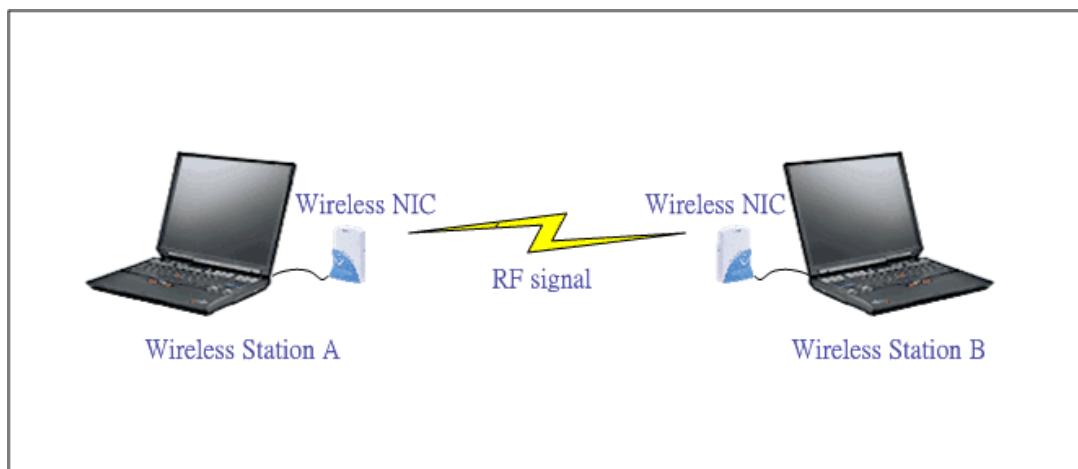
Wireless Application Notes

1. Configure a Wireless Client to Ad hoc mode

Ad hoc Introduction

What is Ad Hoc mode?

Ad hoc mode is a wireless network consists of a number of stations without access points. Without using an access point or any connection to a wired network, a client unit in Ad hoc operation mode can communicate directly to other client units just as using a cross over Ethernet cable connecting 2 host together via a NIC card for direct connection when configured in Ad hoc mode without an access point being present. Ad hoc operation is ideal for small networks of no more than 2-4 computers. Larger networks would require the use of one, or perhaps several, access points.

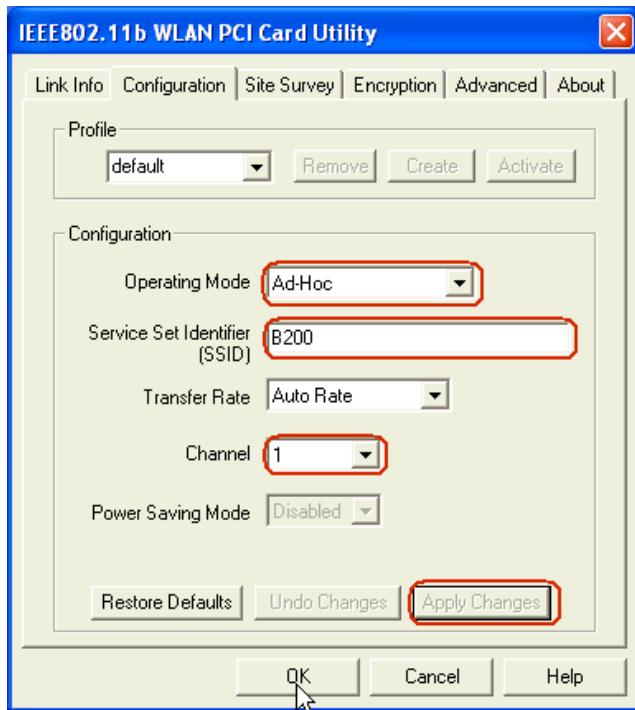


Configuration for Wireless Station A

To configure Ad hoc mode on your ZyAIR B-100/B-200/B-300 wireless NIC card please follow the following step.

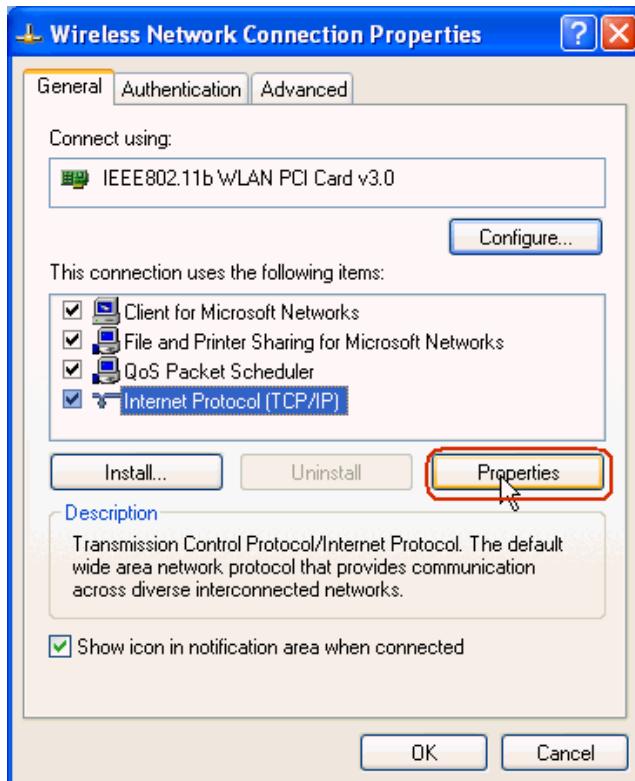
Step 1: Double click on the utility icon in your windows task bar the utility will pop up on your windows screen.

Step 2: Select configuration tab.

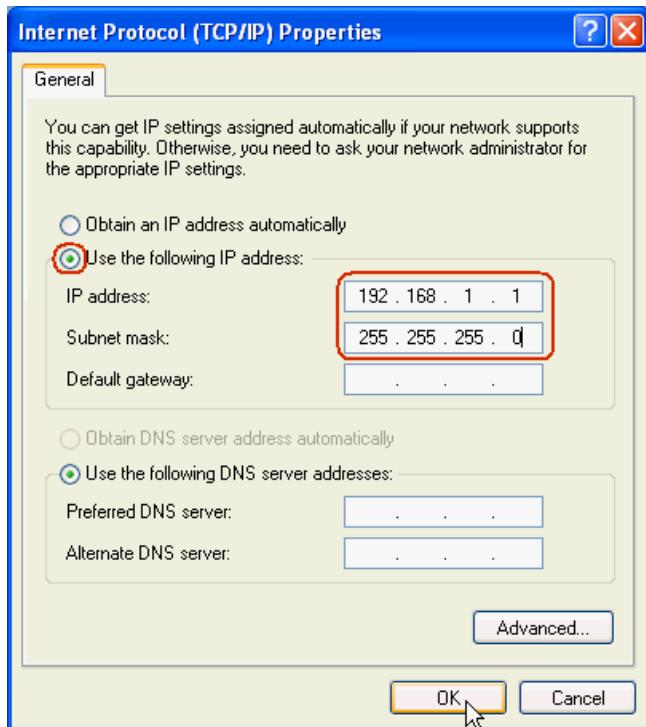


Step 3: Select Ad hoc from the operation mode pull down menu, fill you an SSID and select a channel you want to use than press OK to apply.

Step 4: Since there is no DHCP server to give the host IP you must first designate a static IP for your station. From Windows Start select Control Panel >Network Connection>Wireless Network Connection.



Step 5: From general tab select TCP/IP and click property



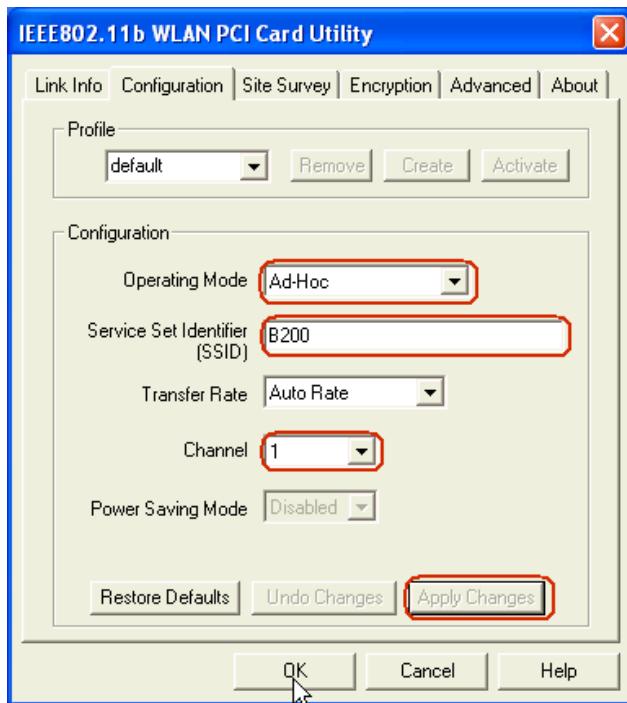
Step 6: Fill in your network IP address and subnet mask and click OK to finish.

Configuration for Wireless Station B

To configure Ad hoc mode on your ZyAIR B-100/B-200/B-300 wireless NIC card please follow the following step.

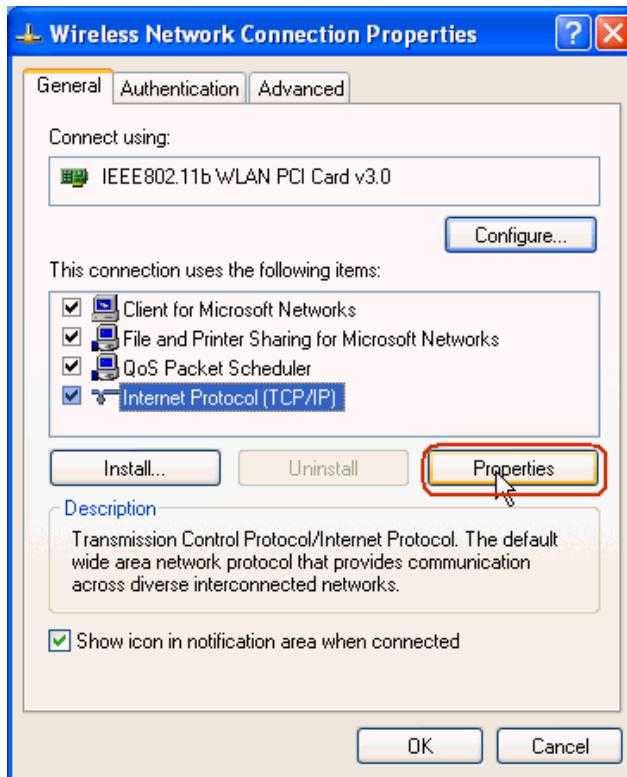
Step1: Double click on the utility icon in your windows task bar the utility will pop up on your windows screen.

Step 2: Select configuration tab.

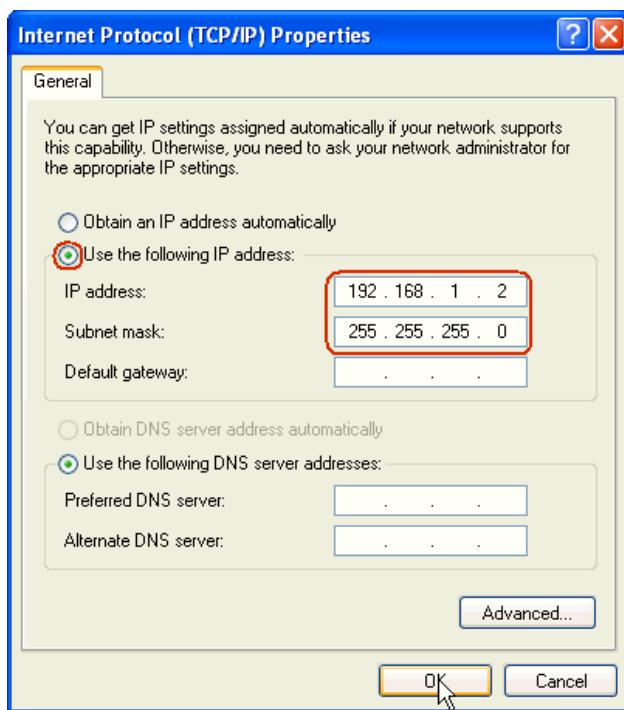


Step 3: Select Ad hoc from the operation mode pull down menu, fill you an SSID and select a channel you want to use than press OK to apply.

Step 4: Since there is no DHCP server to give the host IP you must first designate a static IP for your station. From Windows Start select Control Panel >Network Connection>Wireless Network Connection.



Step 5: From general tab select TCP/IP and click property



Step 6: Fill in your network IP address and subnet mask and click OK to finish.

Step 7: Station A now are able to connect to Station B.

2. Setup WEP (Wired Equivalent Privacy)

Introduction

The 802.11 standard describes the communication that occurs in wireless LANs.

The Wired Equivalent Privacy (WEP) algorithm is used to protect wireless communication from eavesdropping, because wireless transmissions are easier to intercept than transmissions over wired networks, and wireless is a shared medium, everything that is transmitted or received over a wireless network can be intercepted.

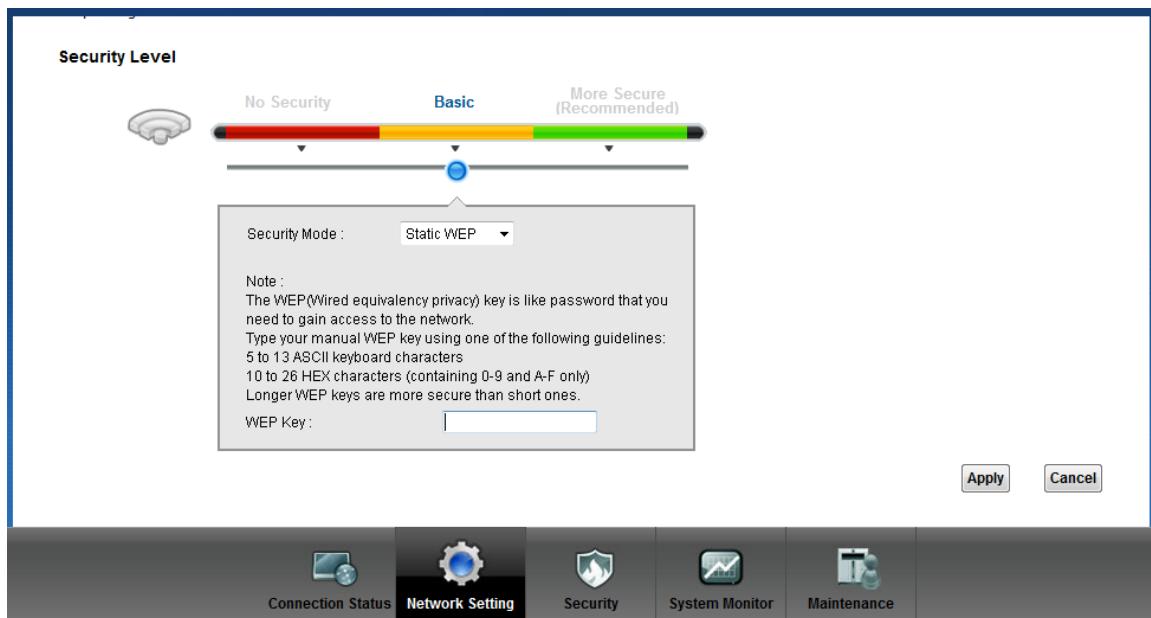
WEP relies on a secret key that is shared between a mobile station (e.g. a laptop with a wireless Ethernet card) and an access point (i.e. a base station). The secret key is used to encrypt packets before they are transmitted, and an integrity check is used to ensure that packages are not modified during the transition. The standard does not discuss how the shared key is established. In practice, most installations use a single key that is shared between all mobile

stations and access points APs. You can refer to the **User Guide** for more detailed information about it.

Setting up the **Access** Point

You can set up the Access Point from Web configurator, **Network Setting-> Wireless -> General**. (You can also configure it via **CLI**):

Step 1: Select '**Static WEP**' from the pull down menu 'Security Mode' in Web Configurator:



Step 2: Set up WEP Key in the Web Configurator. You need to set the one of the following parameters:

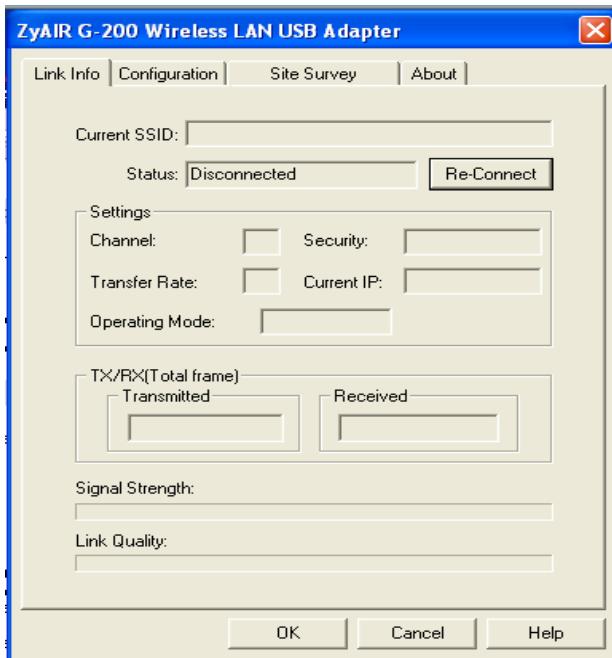
- 64-bit WEP key (secret key) with 5 characters
- 64-bit WEP key (secret key) with 10 hexadecimal digits
- 128-bit WEP key (secret key) with 13 characters
- 128-bit WEP key (secret key) with 26 hexadecimal digits
- 256-bit WEP key (secret key) with 29 characters
- 256-bit WEP key (secret key) with 58 hexadecimal digits

- **Setting up the Station**

Step 1: Double click on the utility icon in your windows task bar or right click the utility icon then select 'Show Config Utility'.



The utility will pop up on your windows screen:



Note: If the utility icon doesn't exist in your task bar, click Start -> Programs -> to start the utility.

Step 2: Select the 'Configuration' tab.

Select 'Set Security' to configure encryption type and parameters correspond with access point.



Note: You should select Key 1 as default Transmit Key, since the P-660HN-Fx is supposed to use Key 1 by default.

Key settings

The WEP Encryption type of station has to equal to the access point.

Check 'ASCII' field for characters WEP key or uncheck 'ASCII' field for Hexadecimal digits WEP key.

Hexadecimal digits don't need to be preceded by '0x'.

For example:

64-bits with characters WEP key : Key1= 2e3f4

64-bits with hexadecimal digits WEP key : Key1= 123456789A

3. Site Survey

Introduction

What is Site Survey?

An RF site survey is a MAP to RF contour of RF coverage in a particular facility. With wireless system it is very difficult to predict the propagation of radio waves and detect the presence of interfering signals. Walls, doors, elevator shafts, and other obstacles offer different degree of attenuation. This will cause the RF coverage pattern be irregular and hard to predict.

Site survey can help us overcome these problems and even provide us a map of RF coverage of the facility.

Preparation

Below are the steps to complete a simple site survey with simple tools.

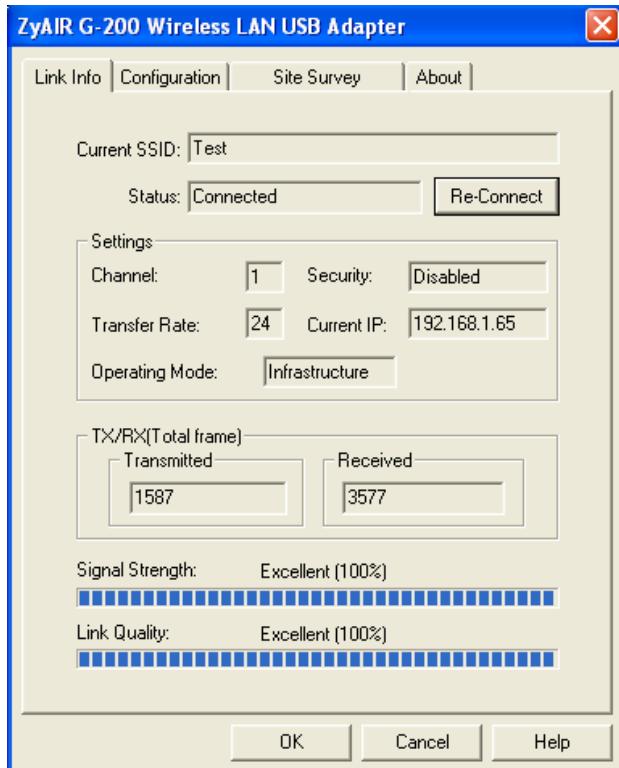
1. First you will need to obtain a facility diagram, such as blueprints. This is for you to mark and take record on.
2. Visually inspect the facility, walk through the facility to verify the accuracy of the diagram and mark down any large obstacle you see that may affect the RF signal such as metal shelf, metal desk, etc on the diagram.
3. Identify user's area, when doing so ask a question where is wireless coverage needed and where does not, and note and take note on the diagram this is information is needed to determine the number of AP required.
4. Determine the preliminary access point location on the facility diagram base on the service area needed, obstacles, power wall jack considerations.

Survey on Site

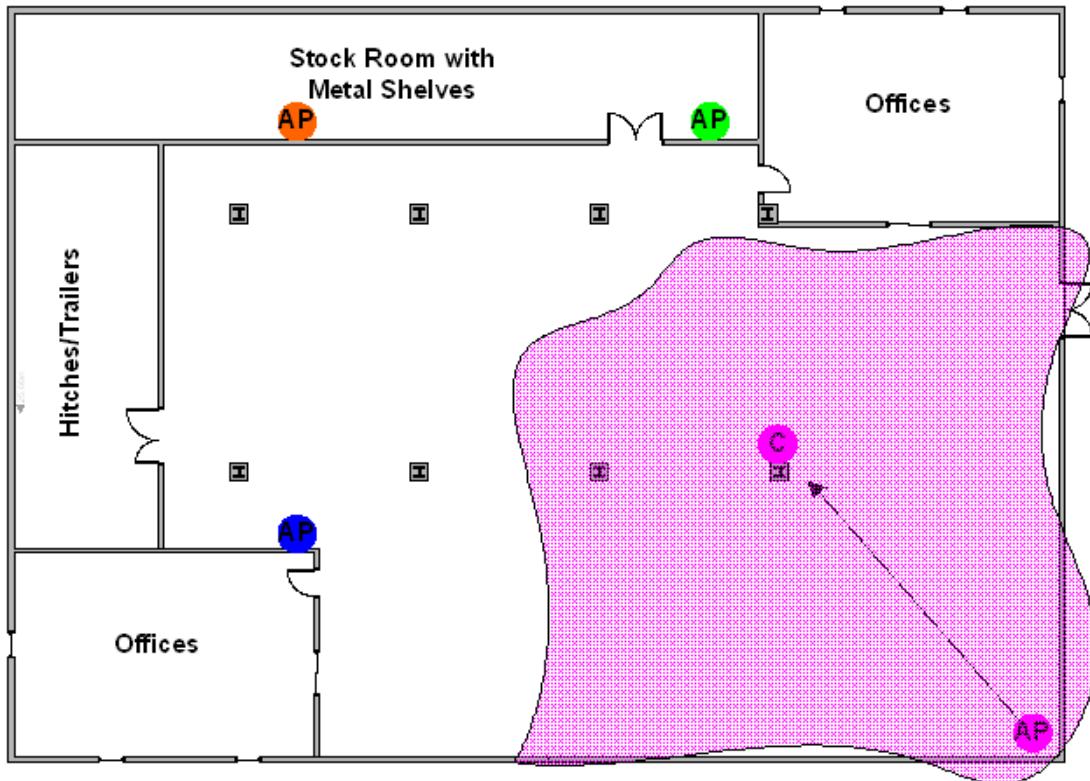
Step 1: With the diagram with all information you gathered in the preparation phase. Now you are ready to make the survey.

Step 2: Install an access point at the preliminary location.

Step 3: Use a notebook with wireless client installed and run it's utility. An utility will provide information such as connection speed, current used channel, associated rate, link quality, signal strength and etc information as shown in utility below.



Step 4: It's always a good idea to start with putting the access point at the corner of the room and walk away from the access point in a systematic manner. Record down the changes at point where transfer rate drop and the link quality and signal strength information on the diagram as you go alone.

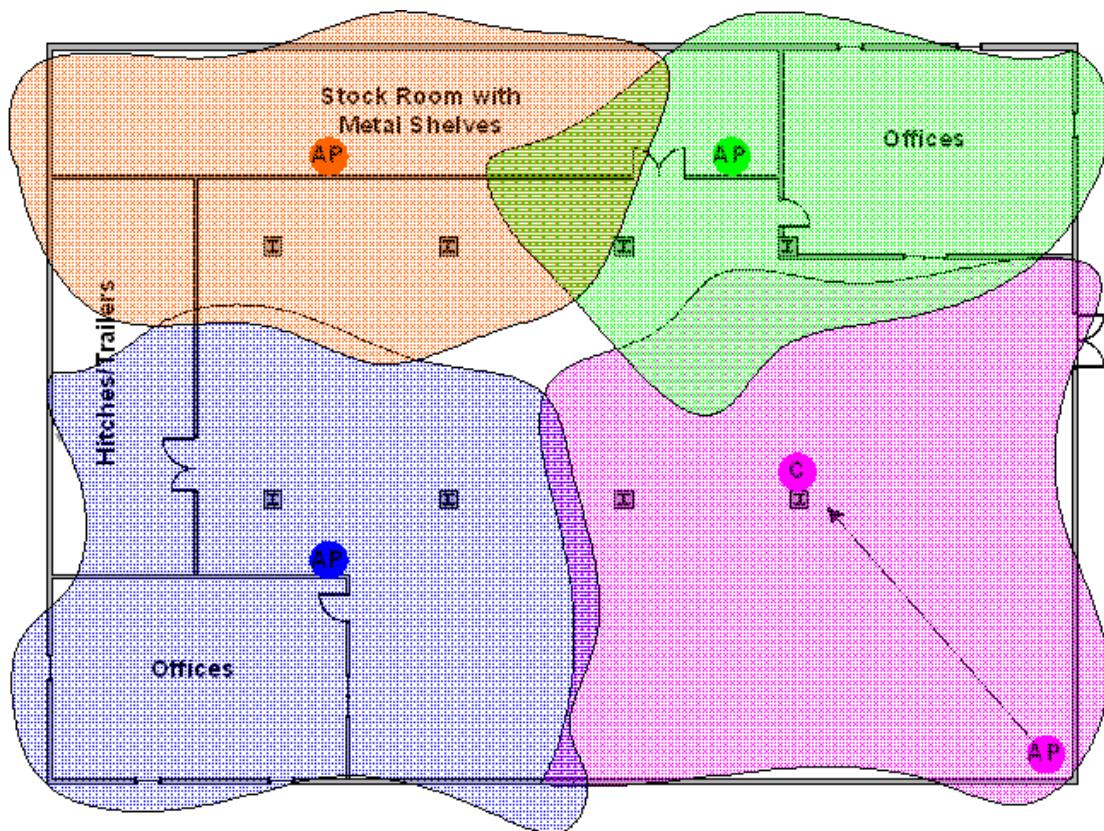


Step 5: When you reach the farthest point of connection mark the spot. Now you move the access point to this new spot as have already determine the farthest point of the access point installation spot if wireless service is required from corner of the room.

Step 6: Repeat step 1~5 and now you should be able to mark an RF coverage area as illustrated in above picutre.

Step 7: You may need more than one access point is the RF coverage area have not cover all the wireless service area you needed.

Step 8: Repeat step 1~6 of survey on site as necessary, upon completion you will have an diagram and information of site survey. As illustrated below.



Note: If there are more than one access point is needed be sure to make the adjacent access point service area over lap one another. So the wireless station is able to roam. For more information please refer to roaming at

4. WPS application

What is WPS?

Wi-Fi Protected Setup (WPS) is a standard created by the Wi-Fi Alliance for easy and secure establishment of a wireless home/office network. The goal of the WPS protocol is to simplify the process for configuring the security of the wireless network, and thus calling the name Wi-Fi Protected Setup.

There are several different methods defined in WPS to simplify the process of configuration. P-661HNU-Fx supports two of those methods, which are the PIN Method and PBC Method.

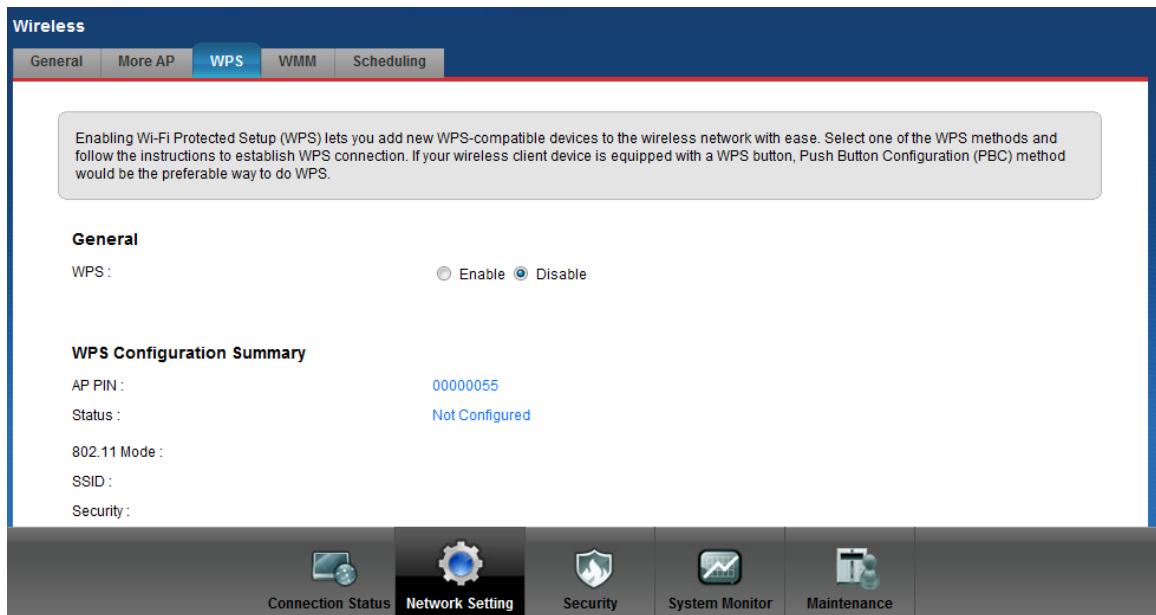
PIN Method:

A PIN (Personal Identification Number) has to be read from either a sticker on the new wireless client device or a display, and entered at either the wireless access point (AP) or a Registrar of the network.

PBC Method:

A simple action of “push button” suffices the process to activate the security of the wireless network and at the same time be subscribed in it.

You could configure WPS via below screen:



5. Configure 802.1x and WPA

- What is the WPA Functionality?
- Configuration for Access Point
- Configuration for your PC

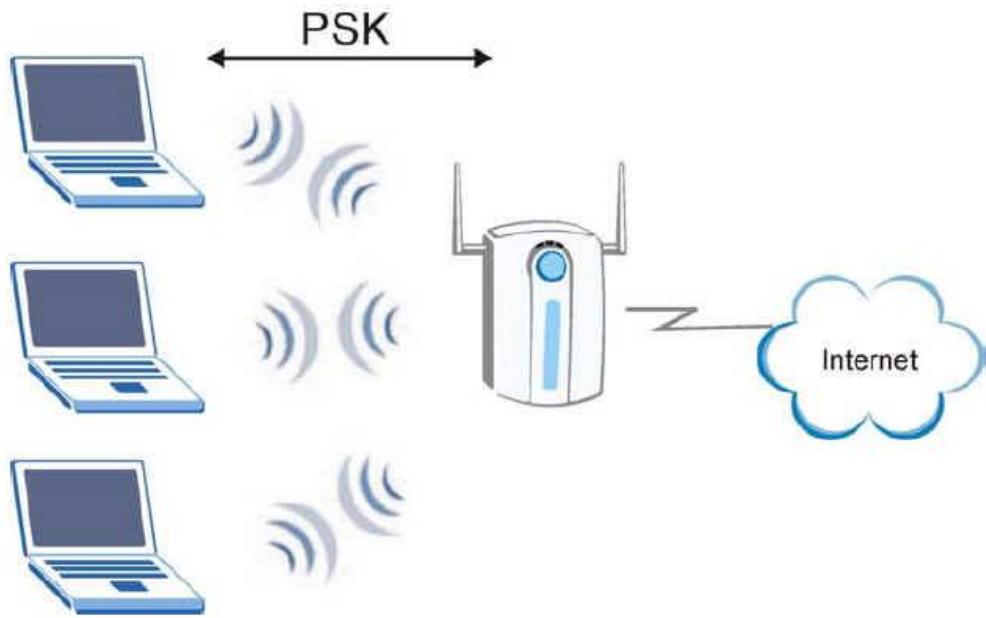
• What is WPA Functionality?

Wi-Fi Protected Access (WPA) is a subset of the IEEE 802.11i security specification draft. Key differences between WAP and WEP are user authentication and improved data encryption. WAP applies IEEE 802.1x Extensible Authentication Protocol (EAP) to authenticate wireless clients using an external RADIUS database. You can not use the P-661HNU-Fx's local user database for WPA authentication purpose since the local user database uses MD5 EAP which can not to generate keys.

WPA improves data encryption by using Temporal Key Integrity Protocol (TKIP), Message Integrity Check and IEEE 802.1x. Temporal Key Integrity Protocol uses 128-bits keys that are dynamically generated and distributed by the authentication server. It includes a per-packet key mixing function, a Message Integrity Check (MIC) named Michael, an extend initialization vector (IV) with sequencing rules and a re-keying mechanism.

If you do not have an external RADIUS server, you should use **WPA-PSK** (WPA Pre-Share Key) that only requires a single (identical) password entered into each access point, wireless gateway and wireless client. As long as the passwords match, a client will be granted access to a WLAN.

Here comes **WPA-PSK Application example** for your reference.



- **Configuration for Access point**

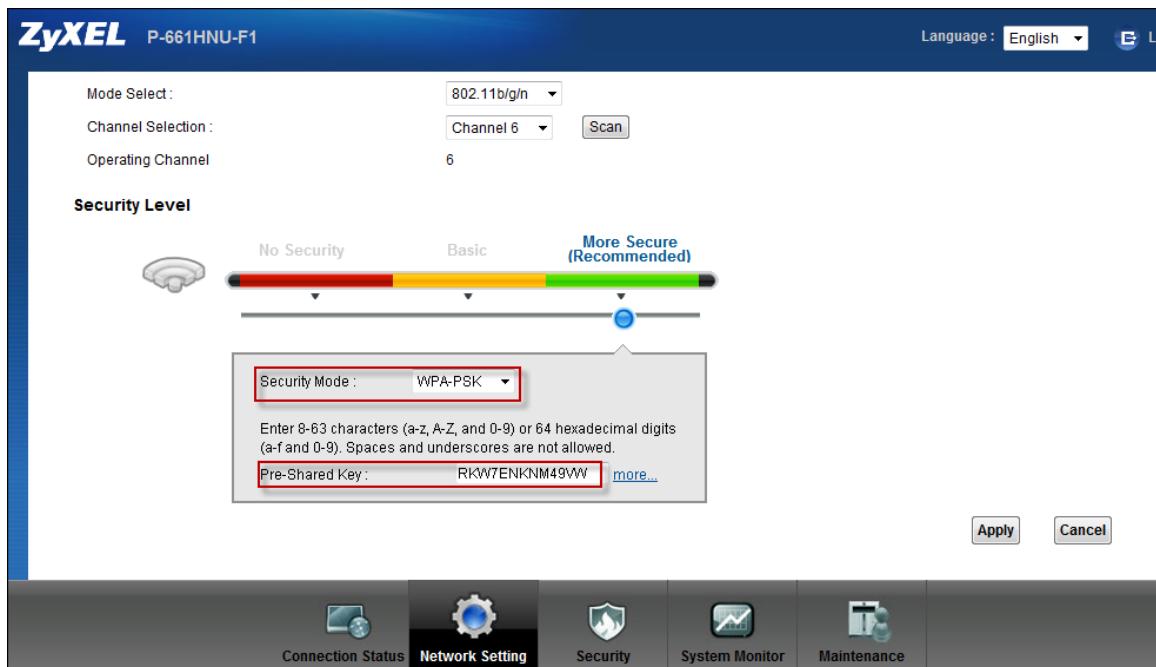
The IEEE 802.1x standard outlines enhanced security methods for both the authentication of wireless stations and encryption key management. Authentication can be done using local user database internal to the P-661HNU-Fx (authenticate up to 32 users) or an external RADIUS server for an unlimited number of users.

Step 1: To change your P-661HNU-Fx's authentication settings, login Web Configurator, Advanced Setup, **Network Setting-> Wireless-> General**

Step 2: Select '**Security Mode**' as **WAP-PSK**.

Step 3: Type the Pre Shared Key in the **Pre-Shared Key** field.

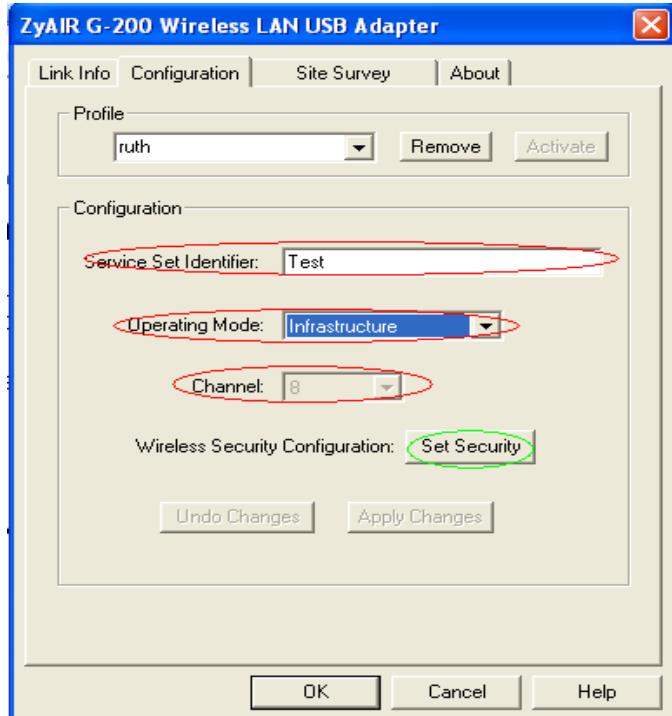
Step 4: Click **Apply** to finish.



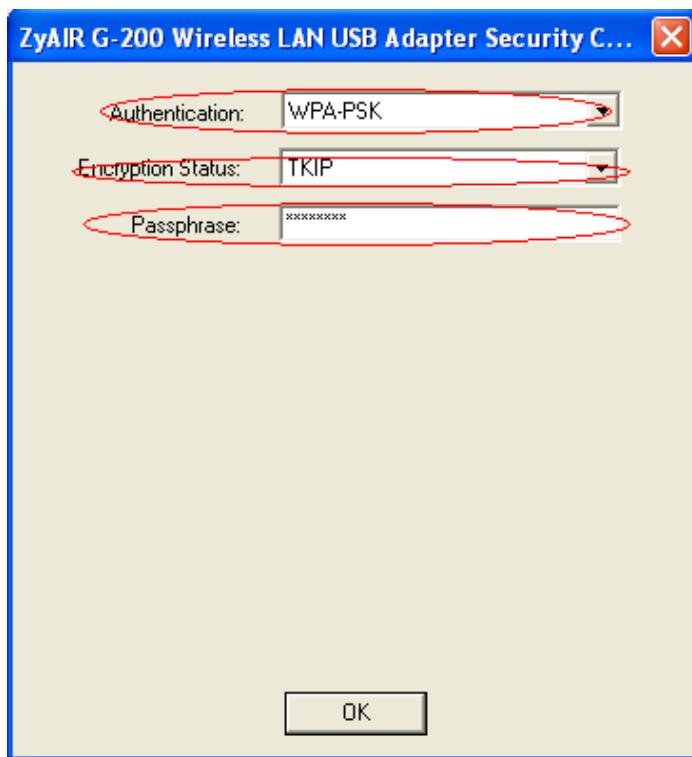
- **Configuration for your PC**

Step 1: Double click on your wireless utility icon in your windows task bar, the utility will pop up on your windows screen.

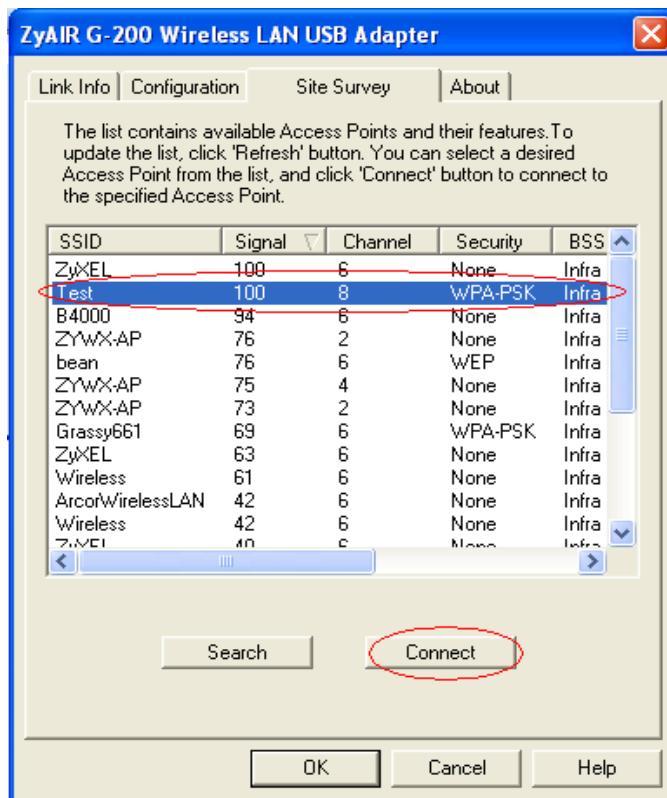
Step 2: Select the configuration tab, type in the SSID (Service Set Identifier), select the operating Mode as **Infrastructure**, and select proper channel.



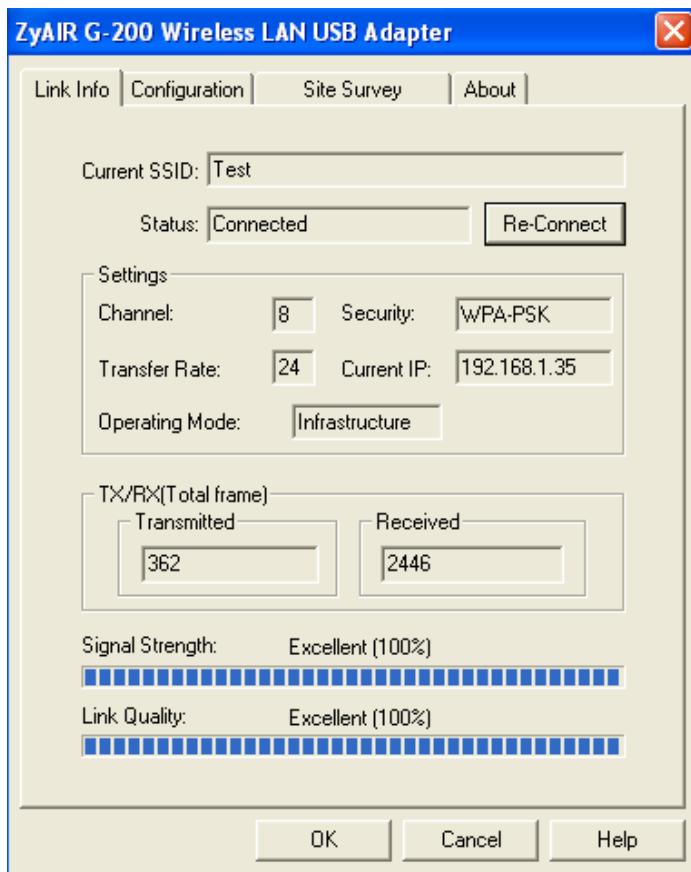
Step 3: Click Set Security to configure the security parameters:



Step 4: Click OK for finish, and begin to Site survey. Connect to the AP as you have configured.



Step 5: Click Link Info tab, if the PC associated and authenticated with AP successfully, we will see the following information.



6. The WPS/WLAN Button

You can use the WPS WLAN ON/OFF button to turn the wireless LAN off or on. You can also use it to activate WPS in order to quickly set up a wireless network with strong security.

1. Turn the Wireless LAN Off or On

- (1) Make sure the POWER LED is on (not blinking).
- (2) Press the WPS WLAN ON/OFF button for 1 to 5 seconds and release it. The WPS/WLAN LED should change from on to off or vice versa.

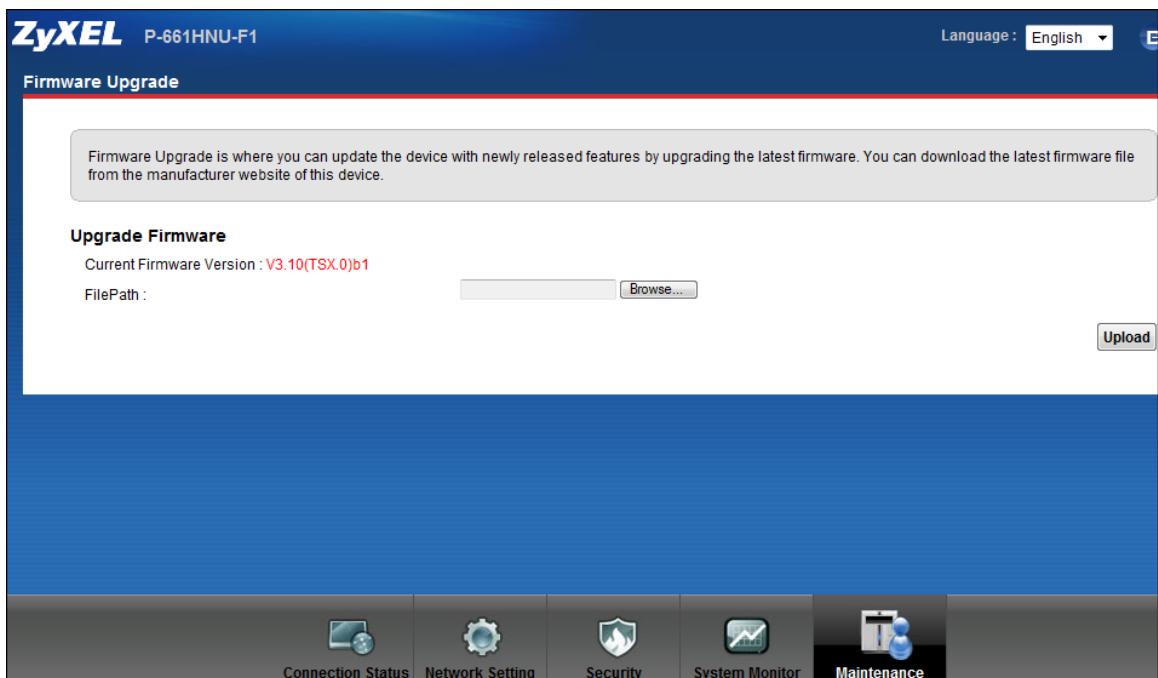
2. Activate WPS

- (1) Make sure the POWER LED is on (not blinking).
- (2) Press the WPS WLAN ON/OFF button for 5 to 10 seconds and release it.

Support Tool

1. Upgrading Firmware via web GUI

- Go to **Maintenance -> Firmware Upgrade**



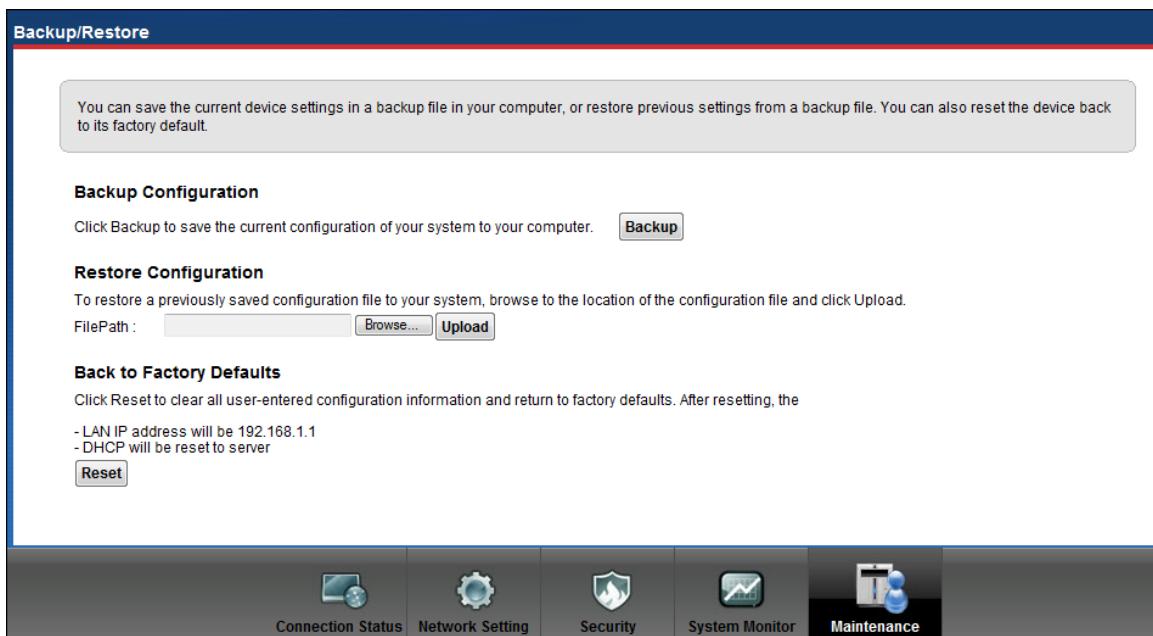
Click **Browse**.

Select the Firmware to upload and click **Open**.

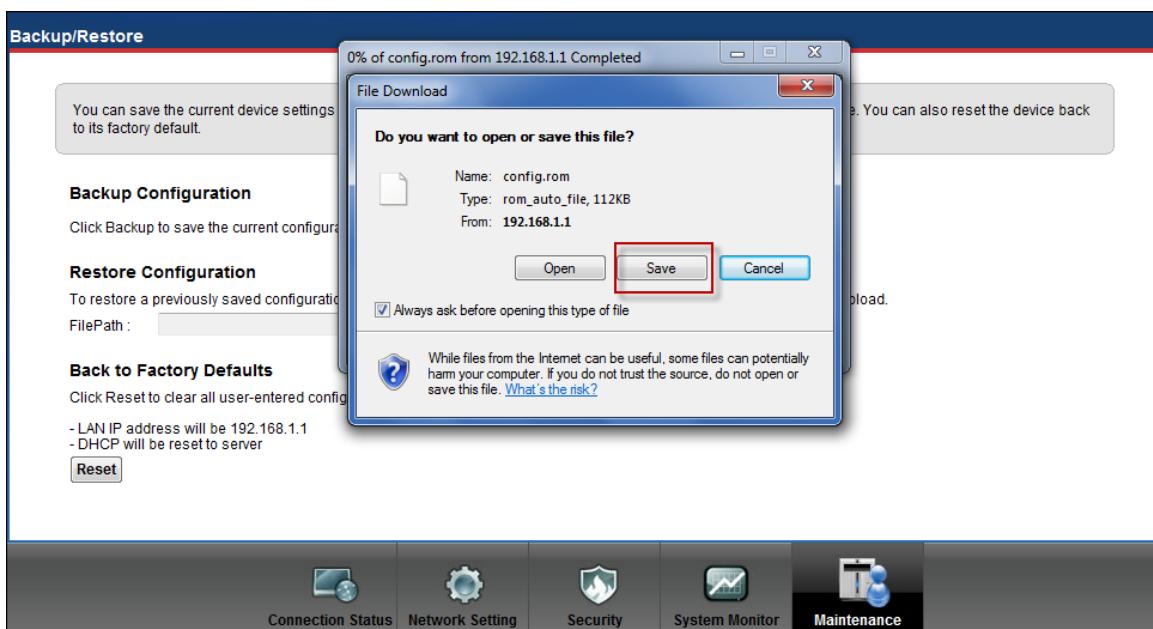
Click **Upload**

2. Backing – up the Configuration

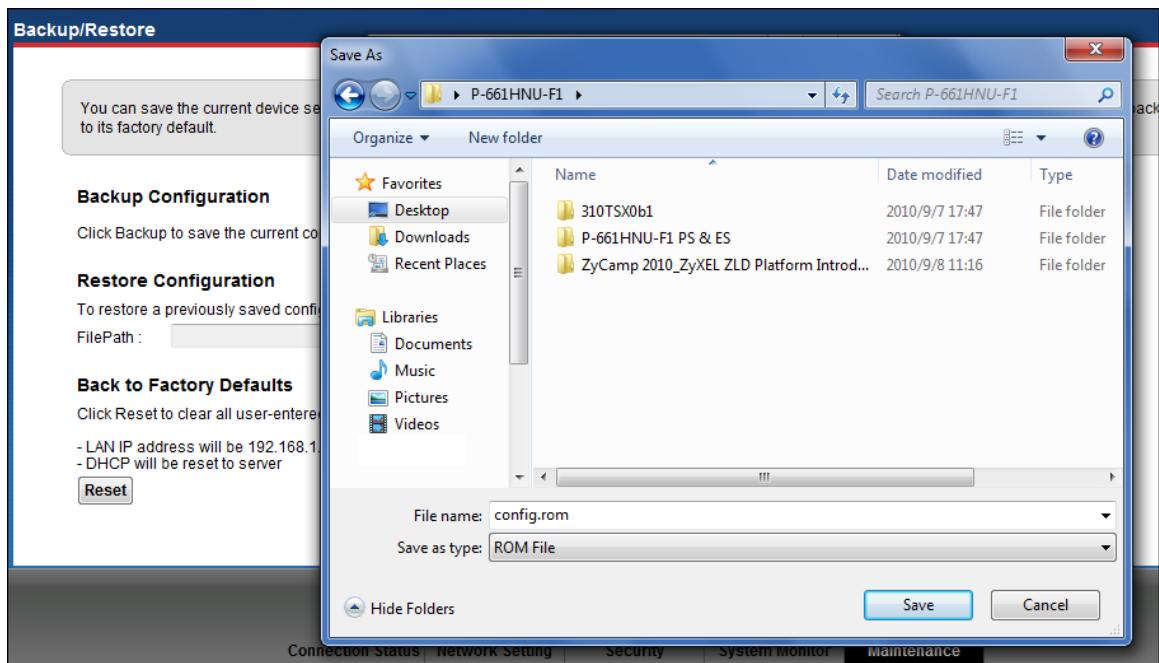
- Go to **Maintenance -> Backup/Restore**



- Click “Backup”.
- Click “Save”.

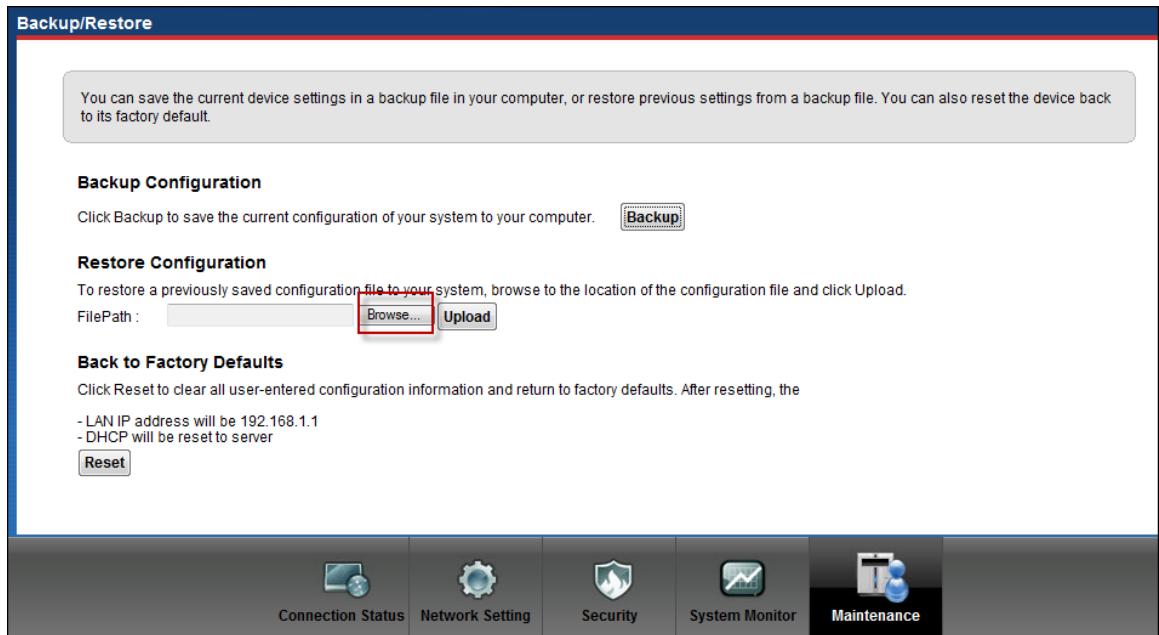


- Select the directory to save and click Save.

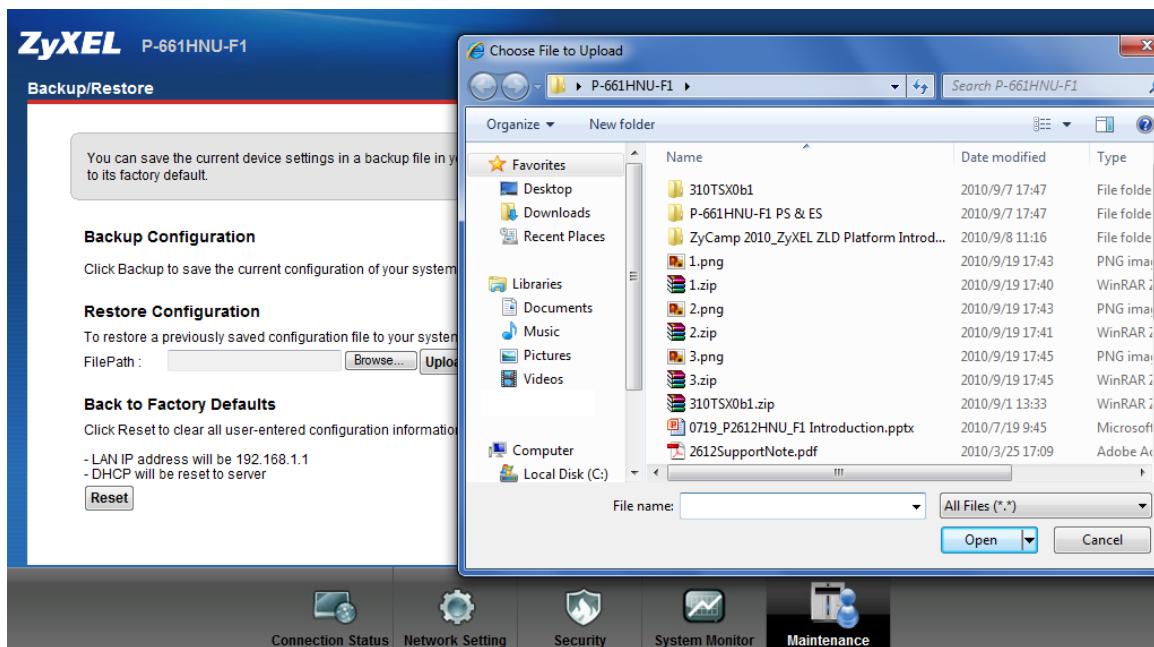


3. Upload Configuration via web GUI

- Go to **Maintenance -> Backup/Restore**
- Click **Browse**.



- Select the configuration file to upload and click **Open**.



4. Using FTP to Upload the Firmware and Configuration Files

In addition to upload the firmware and configuration file via web GUI, you can also upload the firmware and configuration files to the Prestige using FTP.

To use this feature, you could use a FTP client software or just use windows command program. See the example shown below.

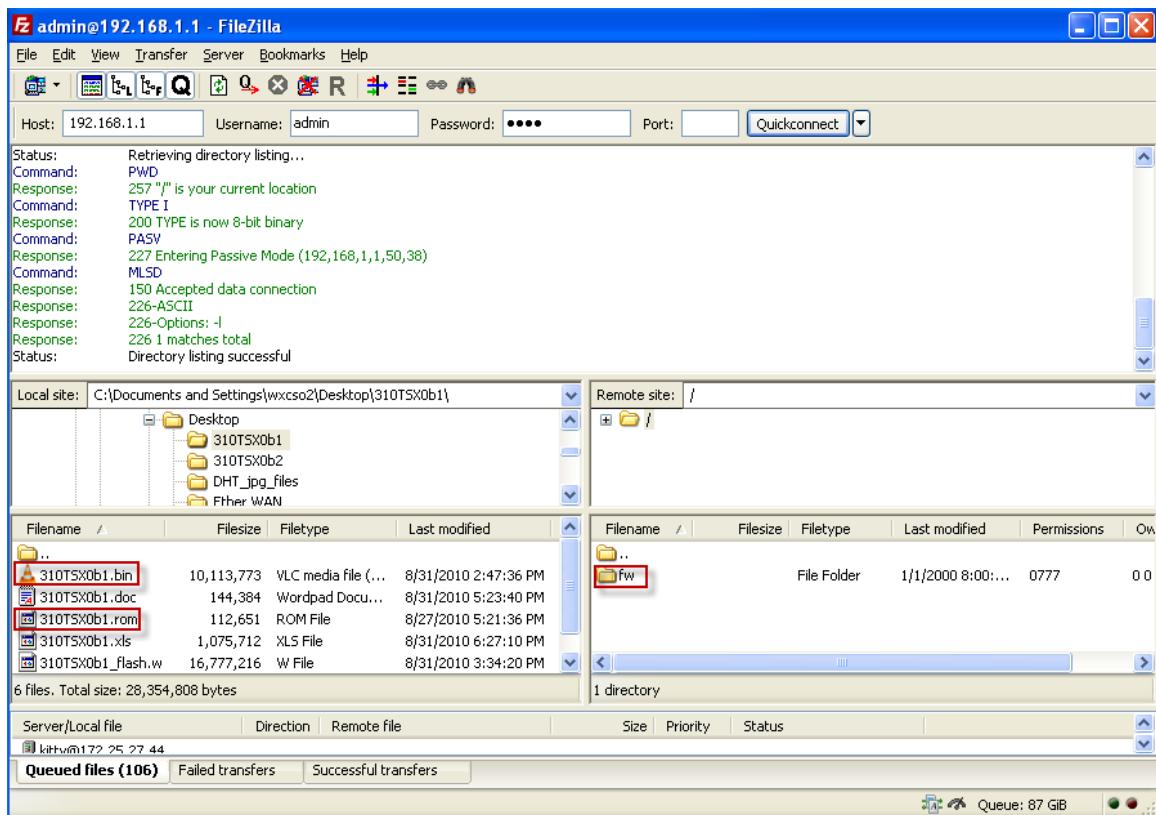
- **Using FTP client software**

Note: The remote file name for the firmware is '**ras**' and the configuration file is '**rom**'.

Step 1	Use FTP client from your workstation to connect to the Prestige by entering the IP address of the Prestige.
Step 2	Enter the Administrator username and password as the FTP login password, the default is ' admin/1234 '.
Step 3	Transfer the file to the Prestige.

Example:

Step 1: Connect to the Prestige by entering the Prestige's IP and Administrator password in the FTP software.



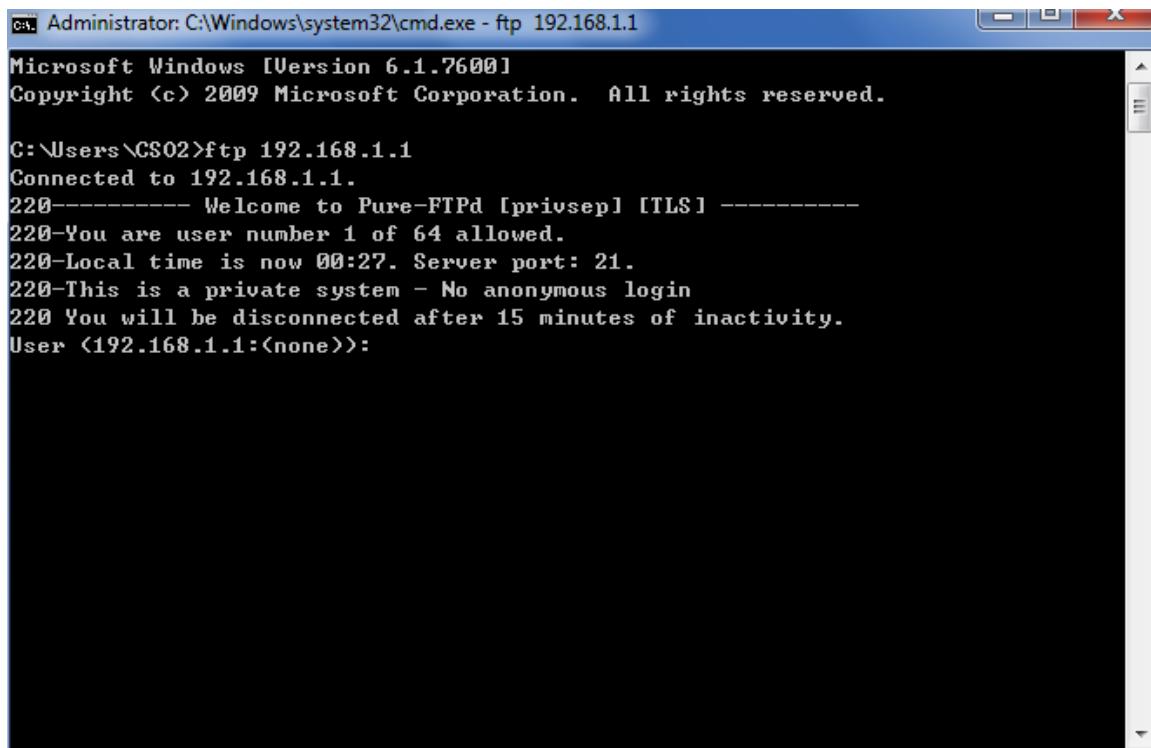
Step 2: To upload the firmware file, we transfer the local '**bin**' file to the remote '**fw**' fold.

To upload the configuration file, we transfer the local '**rom**' to the remote '**fw**' fold.

Step 3: The Prestige reboots automatically after the uploading is finished.
Please do not power off the router at this moment.

Using Windows command

Step 1: Connect to the Prestige by entering the Prestige's IP to access it.

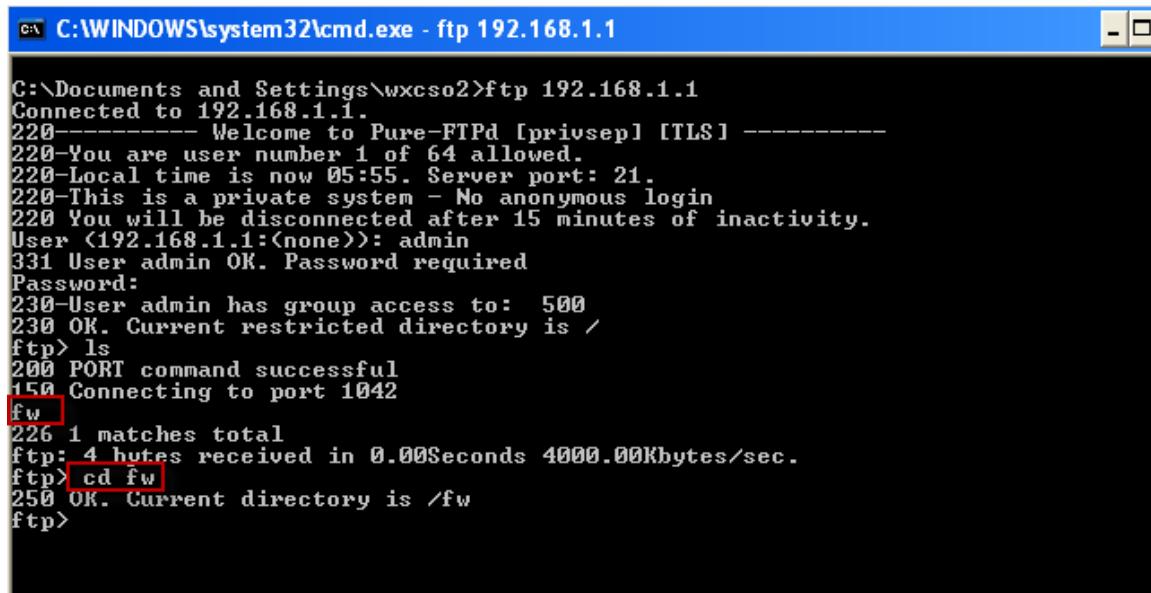


```
Administrator: C:\Windows\system32\cmd.exe - ftp 192.168.1.1
Microsoft Windows [Version 6.1.7600]
Copyright <c> 2009 Microsoft Corporation. All rights reserved.

C:\Users\CS02>ftp 192.168.1.1
Connected to 192.168.1.1.
220----- Welcome to Pure-FTPd [privsep] [TLS] -----
220-You are user number 1 of 64 allowed.
220-Local time is now 00:27. Server port: 21.
220-This is a private system - No anonymous login
220 You will be disconnected after 15 minutes of inactivity.
User <192.168.1.1:<none>>:
```

Step2: Enter the **Administrator** username & password as the FTP login password, the default is '**admin/1234**'.

Step3: Find the **fw** fold and access the fold.



```
C:\WINDOWS\system32\cmd.exe - ftp 192.168.1.1
C:\Documents and Settings\wxcso2>ftp 192.168.1.1
Connected to 192.168.1.1.
220----- Welcome to Pure-FTPd [privsep] [TLS] -----
220-You are user number 1 of 64 allowed.
220-Local time is now 05:55. Server port: 21.
220-This is a private system - No anonymous login
220 You will be disconnected after 15 minutes of inactivity.
User <192.168.1.1:<none>>: admin
331 User admin OK. Password required
Password:
230-User admin has group access to: 500
230 OK. Current restricted directory is /
ftp> ls
200 PORT command successful
150 Connecting to port 1042
fw
226 1 matches total
ftp: 4 bytes received in 0.00Seconds 4000.00Kbytes/sec.
ftp> cd fw
250 OK. Current directory is /fw
ftp>
```

Step4: Enter "binary".

Step5: To upload the firmware file, we put the ras file to the fold.

To upload the configuration file, we put the rom file to the fold.

```
C:\WINDOWS\system32\cmd.exe - ftp 192.168.1.1
220-Local time is now 05:55. Server port: 21.
220-This is a private system - No anonymous login
220 You will be disconnected after 15 minutes of inactivity.
User <192.168.1.1:<none>>: admin
331 User admin OK. Password required
Password:
230-User admin has group access to: 500
230 OK. Current restricted directory is /
ftp> ls
200 PORT command successful
150 Connecting to port 1042
fw
226 1 matches total
ftp: 4 bytes received in 0.00Seconds 4000.00Kbytes/sec.
ftp> cd fw
250 OK. Current directory is /fw
ftp> binary
200 TYPE is now 8-bit binary
ftp> put "C:\Documents and Settings\wxcso2\Desktop\310TSX0b2\310TSX0b2.bin"
200 PORT command successful
150 Connecting to port 1093
226-File successfully transferred
226 2.325 seconds (measured here), 4.15 Mbytes per second
ftp: 10108050 bytes sent in 2.30Seconds 4402.46Kbytes/sec.
ftp> _
```

Step6: The Prestige reboots automatically after the uploading is finished.
Please do not power off the router at this moment.